

SCIENCE MEETS BUSINESS

A Playbook for Lifelong Learning

The Rutgers Master of Business and Science (MBS) Degree

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PREFACE by Deborah Silver, Ph.D.

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Preface

Innovative Integration

Each year marks another reason to celebrate the Rutgers University Master of Business and Science (MBS) degree, a robust, vital program launched in 2010. I want to share a story that is as true today as it was back then.

In the fall of 2019, we started planning an anniversary party to celebrate the ten-year mark. We decided to hold a party in conjunction with one of our alumni-student get-togethers held annually in the student center during Spring Break. Because this was a special event, we wanted a bigger and fancier party. So, we reserved a banquet hall in one of the nice hotels near campus. It was going to be an amazing party!

Unfortunately, the hotel contract had to be paid in full and in advance. This was a significant outlay. And we were apprehensive because of the cost.

Since the event was to be held around Spring Break, and we are in New Jersey, we knew it could sometimes snow during this time.

So, right before signing and sending the check, we threw in a clause we found on Google to protect us from snow and any other highly unlikely “Acts of God.”

Here is the clause we included:

“The performance of this agreement by either party will be subject to Acts of God; war (here or abroad); government regulation; environmental disaster; snow; ice; ice storm, earthquake, hurricane, infections disease issue.”

When was our event supposed to take place? March 25, 2020!

Yes! We actually put in an infectious disease clause in a contract for an event that was to take place during a worldwide pandemic. Even the hotel couldn’t believe it! And we got a full refund—early!

I thought about the lessons from this story.

How can you plan for the future? If there is anything we and the world have learned during the COVID pandemic, is that we need good plans!

It’s not just about writing ironclad contracts. In fact, students take a master’s degree to keep their jobs, but also to navigate their future landscape and get ahead. The essence of most graduate degrees—and maybe all degrees—is teaching students to plan for the future—both to protect themselves in the short term and to help them predict their next steps for the long term.

What is the secret to planning for the future? Is it a skill? Can you learn it? Can we teach it?

The MBS degree, in addition to protecting ourselves with “the snow clause,” saw a substantial increase in our student body during this time. We are currently one of the largest master’s at Rutgers. Our corporate engagement has mushroomed, and most notably, we are one of the most diverse STEM (Science Technology, and Engineering) graduate degrees.

How were we at the MBS able to plan for the future? Not only to protect ourselves, but more importantly, to introduce programmatic changes way before the pandemic, e.g., increased online learning, hybrid learning, remote corporate engagement, and executive coaching, which were on trend and able to anticipate the future?

What is the secret to planning for the future? Being resilient by protecting yourself and your job while predicting where your career is going?

The answer is in our name, i.e., Master of Business and Science, *connecting different disciplines*.

Connections and integration are the secrets to planning for the future. Combining multiple disciplines, like science and business, chemistry with regulatory, analytics with ethics, drug discovery with intellectual property, and user experience design with marketing, i.e., *is the key to protecting and predicting*.

By integrating different disciplines, we can see what is around us and can understand or figure out how the various parts work together in a larger system.

Think of it like armor, arming yourself with multiple skills and shielding yourself from “incoming attacks” or in 2020, from incoming pandemics. By having multiple skills and understanding how things work together you can easily adapt, and this helps you protect yourself.

However, understanding and integrating multiple skills can be even more important. With multidisciplinary integration as a protective armor, you are empowered to move ahead. It lets you connect the dots, see more interesting patterns, and opens new avenues of innovation and exploration.

In February 1996, Gary Wolf with *Wired* interviewed Steve Jobs and asked him about the value of a well-designed product. In the article, “Steve Jobs: The Next Insanely Great Thing,” he was quoted as saying,

Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn’t really do it, they just saw something. It seemed obvious to them after a while. That’s because they were able to connect experiences they’ve had and synthesize new things. And the reason they were able to do that was that they’ve had more experiences, or they have thought more about their experiences than other people.¹

This is especially true with the advent of artificial intelligence. Understanding how different pieces fit together and whether they should be put together is an innately “human” skill.

By looking for connections, we can consider all factors in a decision and take a more holistic view.

Creating the MBS has been a joint effort with outstanding faculty and staff all working towards an innovative solution to provide the best educational resources to professionally-based students—connecting various aspects of the university to offer a seamlessly, integrated experience...

Deborah Silver, PhD

Executive Director, Professional Science Master's Program

----Master of Business and Science (MBS) Degree

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Introduction

Becoming a Lifelong Learner

Where Science Meets Business

“Education is the kindling of a flame, not the filling of a vessel.” Socrates

While both a Master of Business Administration (MBA) and a Master of Science (MS) program existed, neither was exactly what was needed to answer a question that would ultimately reveal a very large need: “Where could STEM graduates go to learn more about STEM business?”

From that question, a new program was created that grew tremendously during the next thirteen years. Who is attracted to this experience? Why is the program so appealing? What is to be gained and retained from this experience?

Answers to all these questions are revealed in this playbook—a story about the team, their process, and the lessons learned that resulted from this program.

Why a Playbook?

Many have said that behind every great, winning team, there is a great, winning playbook. It’s not talent alone that creates winning seasons. It’s a playbook that gets everyone on the same page with respect to the mindset, strategy, values, and practice throughout the entire season to produce a championship team. The playbook not only shares plays, but the ways in which everyone—players, coaches, and staff—works together to contribute to individual and team success. A great playbook is essentially an indispensable roadmap or plan and an invaluable institutional learning tool for the continuous improvement of any program. For all these reasons, the playbook’s reason for being is highly applicable and necessary for a successful MBS degree program.²

What are the goals of the MBS success-filled playbook?

1. Inform and engage MBS students to fully participate in the breadth and depth of the MBS experience to achieve their own definition of success.
2. Showcase the faculty’s best practices that ensure relevant curriculum and experiential learning for student success.
3. Drive the structure, operation, and efficiency of the MBS degree program to ensure program sustainability.
4. Provide an invaluable, personalized, lifelong learning approach to career and life guidance that is relevant and extends beyond receiving the MBS degree.

How does success happen?

The MBS playbook shares the secrets behind the success. Not just the secrets behind the success of the program but, more importantly, the MBS secrets that will lead you to your current and future success. Here's a brief description of some of the secrets to success behind this MBS degree program:

1. “Differentiators” that make the MBS courses and concentrations unique and beneficial to industry employers, for example, the use of executive coaches and the capstone teamwork approach.
2. Experience-tested, real-world experiences presented broadly, such as networking, class trips, externships/internships, and classes taught by industry experts and MBS alumni.
3. Availability of courses and concentrations based on emerging workplace opportunities facilitated by research and flexible platforms that allow for timely introduction.
4. Teaching a lifelong learning mindset that extends “growth” well beyond the MBS degree experience.
5. Student-focused—including flexible scheduling and networking opportunities for a positive ROI.

The MBS Playbook

This playbook is an overview of its component parts, which, if studied and retained, will allow you to get the most out of your whole MBS experience.

Each chapter of this playbook captures a differentiating and innovative aspect of the MBS degree program by sharing its importance and benefit to you and the industries being served. Each chapter puts the learning in a broader context so that these important variables can be taken into consideration for use in future scenarios.

All the experiences come from the faculty, staff, students, alumni, and numerous others who participated and contributed to this program—so they've been validated by your colleagues!

Is this playbook for STEM students only? We hope those and more!

For those who have taken or are taking the MBS degree program, we hope this is a good reflection of your experiences. For those who are about ready to participate in the MBS degree program, we hope this gives you a big picture and long-term perspective on how this program will benefit you. For faculty or other prospective students, we hope it creates interest, curiosity, and excitement to consider some new ideas!

As we uncovered the reasons for the growth of this program, it became clear this playbook would have another important purpose—to show how the MBS degree program is a guide for integrating a lifelong learning mindset into your thinking and how becoming a lifelong learner advances your career development and advancement, regardless of what your future holds.

This playbook provides action steps for how you can benefit from the MBS degree, not only in the short term but long after you receive your degree. The MBS degree is the starting point, but the principles you will learn in the program will benefit you throughout the rest of your career journey. As a new faculty member noted,

“This degree is more than a certificate that you get to check off your list or gaining skills and moving on as with an undergraduate degree. This MBS degree is a program with an opportunity to improve not only your current situation but your future by becoming a lifelong learner.”

Here’s a brief overview of the chapters and their unique contributions to a lifelong learning mindset:

Chapter 1: The Lifelong Learning Mindset—Where the Master of Business and Science Meets Your Career Planning

A Learning Mindset. This chapter shines a light on how the business world is changing and what you need to prepare yourself for a successful career. It makes the case for why a lifelong learning mindset is important for your career progression and provides strategies for developing one. It also describes the MBS degree program differentiators that are meant to facilitate becoming lifelong learners.

Chapter 2: The Master of Business and Science Degree Program—Where Science Meets Business (Finally)

Discovery and Differentiation. The fascinating progression of the MBS degree program is chronicled. Through the examination of its successes and challenges, this chapter provides a wealth of “lessons learned” for why this program is successful and how you can build and grow your own successful program. Students share their insightful comments as beneficiaries of the program’s offerings.

Chapter 3: The Value of a Master’s Degree—Where Learning Meets Mastering

Respected Mastery. Pursuing a master’s degree is on the rise. This chapter explains the reasons behind the growth of this degree. It describes the skills required to achieve this level of mastery and the credibility and importance associated with a master’s degree. Positive satisfaction perceptions associated with achieving a master’s are supported by data. The Professional Science Master’s (PSM) program is explained and its embrace of the Rutgers MBS degree.

Chapter 4: “Professional” Science Skills—Where Science Meets Knowing How

Relevant Expertise. This chapter aims to provide the comprehensive considerations behind the selection of the science courses, concentrations, and tracks that create the desirability of MBS graduates in the marketplace and the appeal of the program. The importance of industry-experienced instructors and the need for a strong experiential component in the coursework reflect the relevance of this program. Student outcomes reinforce the value of these offerings.

Chapter 5: Fundamental Business Skills—Where Business Meets Knowing How

Fluency. The purpose of this chapter is to showcase the courses that provide the business language and literacy to communicate effectively with industry colleagues. It conveys the numerous ways in which the business skills that are gained lead to acquiring jobs, advancing, and gaining leadership positions. It describes the thoughtful criteria used to identify the course and concentration offerings and their fit with the rigorous PSM program criteria. This chapter shares examples of industry-experienced instructors and the widespread use and importance of practicing lessons learned in a real-world context.

Chapter 6: Externships and Internships—Where the Classroom Meets Real-Life

Refined Application. The importance of the experiential component in the curriculum is explained and shows how students engage with organizations, receive mentoring, and gain professional experience by working on real problems and challenges. Both students and company mentors uniquely benefit through the aid of Rutgers instructors overseeing the offerings to ensure a learning experience for all. The chapter conveys the details of these programs, including the companies involved, the types of challenges tackled, and examples of student experiences.

Chapter 7: Leadership and Communication Skills—Where Self-Awareness Meets Impact

Self-Awareness. The MBS degree program increases your level of communication and leadership skills through self-awareness. This understanding is facilitated by executive coaching, a differentiator, relative to communication and leadership courses at other institutions. Examples are given of how students are beneficiaries of coaching and the ways in which it enhances their decision-making skills, networking, and job opportunities.

Chapter 8: The Capstone Project—Where Entrepreneurship and Intrapreneurship Meet Accomplishing

Innovation and Integration. The Capstone Project satisfies the master's thesis requirement through objectives, methodology, and output. It is uniquely tailored to provide a teamwork approach to bringing business and science together to create an innovative business proposition around an intellectual property. Breaking innovation down into steps and making this more than

a theoretical exercise is what gives this course its lifelong value for entrepreneurs and intrapreneurs.

Chapter 9: Your MBS IDP Playbook—Where Business and Science Meet Your Career Goals

Design Planning. The “heart” of the playbook is in this chapter, which pulls together all the content from the previous chapters and provides a template for how “to design” your career goals for the near term and farther out. The chapter describes currently used tools, i.e., “Design Your Life” and the “Individual Development Plan” as input for Rutgers MBS Playbook Plan, a career development tool that helps you achieve your career goals and aspirations. It explains how and why a lifelong learning mindset is an important framework for sustained satisfaction and forward movement throughout your career.

Chapter 10: Designing Your Future—Where Lifelong Learning Mindset Becomes the Learner

Lifelong Learner. This final chapter shares how the MBS degree helps prepare you for the future. While attending the MBS degree program, you will gain important knowledge and skills for turning that “knowledge into know-how,” i.e., practical, applied skills for effective use in the workplace and life. But the MBS degree also helps you “learn how to learn.” The MBS Playbook Plan is a tool that can be applied to your evolving career opportunities throughout your life. The long-run goal is “self-actualization,” however you choose to define it: growth, joy, fulfillment, satisfaction, looking forward, hope, optimism, or achievement on your terms.

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Welcome to an exciting opportunity to evolve, learn and grow. We hope you find value in the experiences and thoughts that follow and agree that a Rutgers MBS education will benefit you for the rest of your life!

Let's get started!

NOTES

Preface

1. Gary Wolf, “Steve Jobs: The Next Insanely Great Thing,” *Wired*, February 1, 1996 (12:00PM), <https://www.wired.com/1996/02/jobs-2/>.

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2. Nancy Bock, “Why Playbooks Are A MUST for Successful Continuous Improvement,” *Eon*, June 29, 2021, <https://eonplatform.io/blog/why-playbooks-are-a-must-for-successful-continuous-improvement>.

Chapter 1

The Lifelong Learning Mindset

Where the Master of Business and Science Meets Your Career Planning

“Once you have glimpsed the world as it might be, it is impossible to live anymore complacent in the world as it is.” Anonymous

Thinking about your career planning.

Likely, you have already started thinking about your career aspirations and what will help you achieve your dreams. Where are you now? Where do you want to go? How will you get there? How will future events affect your career that might span decades?

This chapter is important for making the exercise of career pursuit and selection a real one. Whether seeking a first-time job, a promotion, a change of profession, or a change of industry through a higher academic degree, a career development plan is needed. Identifying careers of interest to you is a complex task connecting personal motivations and professional preferences. Learning about job opportunities requires an expansive approach. The same type of job can be found in different employment sectors and may be listed under different, sometimes non-intuitive, titles. Career paths are not generic. There are many specialties and niches that may better fit you than the one you initially sought. Exploring options of interest will help you cast an appropriately broad net in your job search.

Within one month of beginning your first semester in the program, you will identify three job descriptions that you can envision doing upon graduation. Be prepared to share them with others in the program. Sharing thoughts about career choices among classmates is important because those discussions can expand your awareness of career options, direct you toward the most desirable qualifications, and broadly inform you of the pros and cons of your jobs under consideration.

However, before we share thoughts about what you can do to affect your career path, let's start with how futurists are casting what your career path will look like over the coming years. Knowing about these projections will help you better plan for and navigate it!

Here are several different perspectives on how your career paths could be very different from what you imagine today.

“A 60-year career?”

In thinking about the future of the workplace and how long your career might be, a radical thought was shared in a recent Wall Street Journal article by Carol Hymowitz, “Here Comes the 60-Year Career.”

As people live longer, healthier lives, the traditional 40-year career will become a thing of the past. But that's going to require a new mind-set—and a lot more planning.

Millennials...are starting to think about their careers in a totally different way from their elders. They have no choice: Because they are likely to live healthily into their 90s or longer, they must learn to navigate 60-year careers instead of the traditional 40-year span.

But such a change will require a new mind-set when it comes to planning a career. Instead of advancing vertically up a single path, for instance, people will need to move sideways—and even down at times—as they traverse different jobs and multiple careers. They will have to make sure they have adequate income to sustain themselves over lengthy lives. They will need to figure out where they derive the most job satisfaction so they don't burn out after decades of working. They will have to keep acquiring new skills to avoid becoming obsolete. And, if they can afford to, they may want to take occasional career breaks to balance their personal and professional lives.

'Over the course of 60-year careers, we'll need to work and pace our careers differently,' says Laura Carstensen, founding director of the Stanford Center on Longevity.¹

How to navigate it?

How will this new career longevity take shape, and what will be required to navigate it well? The Wall Street Journal article by Carol Hymowitz, “Here Comes the 60-Year Career,” provides seven suggestions.

1. Expect a career that resembles a jungle gym rather than a ladder.

Already, a lot fewer workers expect to stay at a single company throughout their career. That trend will only accelerate as careers get longer. After all, few people will want to stay at the same job for 60 years, even if they could (a big if). It is a recipe for job and life dissatisfaction and stagnant income. And few companies have shown the kind of loyalty that would encourage such careers.

Instead, employees should imagine a career that involves making leaps sideways and across rungs rather than a straight climb upward.

2. Lifelong learning, including breaks to return to school, will be essential.

It is hard enough now to stay up-to-date with technology and other job requirements, and to train for new opportunities. Add 20 years to careers, and it becomes even more daunting. In addition, many employees will want to start second or third careers over the course of their longer working lives, which will require returning to school for training and maybe even new degrees.

3. Seek flexibility to have a better work/life balance.

As people live longer, and careers lengthen, their priorities change. They'll also face conflicting demands. For instance, for growing numbers of young and middle-aged adults, caregiving responsibilities for older parents overlap with caring for young children.

4. Learn strategies for restarting a career after a break.

In March 2022, LinkedIn introduced a new category—Career Breaks—for users who are building profiles to describe the highlights of their time away from traditional jobs, including family responsibilities, volunteerism and travel. The new label should help normalize the idea that careers aren't always linear.

5. Build an intergenerational network.

Over the course of a six-decade career, workers need to nurture relationships not just with superiors but with colleagues who are junior to them.

Colleagues who are younger may be more skilled with new technologies, and be able to help older colleagues learn and adapt to them. And because there aren't clear career paths, it is more likely that positions will shift. A colleague who's younger in age may advance beyond their former bosses and be in a position to hire them or connect them to other jobs.

6. Explore new paths even when you're enjoying your current career.

It's typical for people to keep their heads down and focus on the job and employer they have, especially if they are satisfied. But in an era of long, multiple careers, it's important to think about alternative paths before you have to or feel pressured to make a change. The odds are much greater that you'll need to take that path one day.

To that end, experts advise people to attend professional meetings or conferences in areas they want to learn about, and to spend time thinking about what they might want to do next, just in case.

7. Don't try to plan it all out.

It is impossible to map out what will happen over a 60-year career. Too many things—in our personal lives, in the economy, in the workplace—will change. Nobody has a crystal ball that can look that far into the future.

What's important, rather, is finding jobs and work environments that are both enjoyable and challenging. In the past, when careers typically involved a vertical climb, it made sense for employees to set goals they wanted to reach by a specific time or age. But trying to do this can be counterproductive today. The ability to be agile rather than rigidly focused on a handful of goals will be essential when traversing a career that lasts more than half a century.²

“Workquakes!”

In Bruce Feiler’s recent book, *The Search: Finding Meaningful Work in a Post-Career World*,³ and in his articles, he shares the following insights about future “workquakes” that disrupt work every couple of years and their implications for planning a career.

Many are unhappy with work.

America is at a once-in-a-generation turning point around work: 70 percent of us are unhappy with what we do; three-quarters of us say we plan to look for new work this year; two-thirds of us are rethinking where, when, and how we work.

Add those numbers up, meaning every day, 100 million Americans sit down with someone they love and say, “I’m not happy with what I’m doing, and I want to do something that makes me happy.”⁴

Seeking solutions.

I’ve spent the last six years crisscrossing the US trying to identify what makes some people love what they do and others feel frustrated. I’ve collected and analyzed 400 extensive life stories of Americans of all backgrounds, all incomes levels, and in all 50 states.

The No. 1 thing I’ve learned is that the people who are happiest and most fulfilled don’t climb, they also dig. They perform what I call a “meaning audit,” doing personal archaeology to unearth the lessons of work they inherited from their parents, the values they admired in their role models, and the dreams they’ve been nursing since childhood.

Sure, some people set a goal and achieve it, but far more people rethink their priorities, adjust their passions, and break away from stifling expectations. My data shows that the average person goes through 20 “workquakes” in the course of their lives — that’s one every 2 1/2 years. A workquake is a disruption in which you’re either forced to — or choose to — rethink or reimagine your work life.

Women go through them more frequently than men, younger workers more than older workers, and diverse workers more than non-diverse workers, which means their number is only going to grow.

The biggest mistake people make in a workquake is to look too quickly for a new job. The reason: You’ll succeed! You’ll find a new job — but soon enough you’ll be back where you started, asking the wrong questions and getting the wrong answers.

Instead, the smartest people realize that the biggest impediment to finding meaningful work is not what you don't know about work. It's what you don't know about yourself. You can bounce from job to job; but if you don't tap into the earliest tensions, frustrations, and longings of your life — the personal work scripture unique only to you — you'll never be happy.⁵

Strong professional networks are key during “workquakes.”

We don't go through life transitions alone. We go through them with colleagues, mentors, spouses, family and friends. In his research, Feiler asked people going through “workquakes” where they got the best advice. The most frequent answer was not family or friends, but people in their professional networks—and three quarters of the time the person giving advice affirmed what the other person already felt they should do. “It turns out what most people need is not a kick in the pants or a slap upside the head,” Feiler said, “It's a pat on the back.”⁶

Necessary, frequent upskilling and reskilling in a rapidly changing world.

Not surprisingly, in many areas, including STEM-related ones, the world is constantly innovating and evolving. This creates the need for your job to keep pace with this rapid change through upskilling and reskilling throughout your life.

A McKinsey article, “Seven Essential Elements of a Lifelong-Learning Mind-Set”⁷ reminds us of the need to constantly update our skill sets as the world is rapidly changing. As a STEM professional, this would certainly not be news to you.

***Organizations around the world** are experiencing rapid, sweeping changes in what they do, how they do it, and even why they do it. Increasing globalization and new technologies demand new modes of working and talent with new and diverse skills. To flourish in this environment, individuals must keep learning new skills. In fact, studies show that workers who maintain their ability to learn outpace other professionals.⁸*

The people who will thrive in the 21st century will be those who embrace lifelong learning and continually increase their knowledge, skills, and competencies.⁹

Building a workforce of such lifelong learners is critical for organizations to respond to a changing business environment. To ensure they have the required skills and talent, companies must create a learning-for-all culture in which people are encouraged and inspired to continue learning new skills.

But, the burden does not fall exclusively on businesses; it's also up to the individual to seize the opportunity to get ahead.⁷

Peter Cohen, president of the University of Phoenix, echoed a similar sentiment in the University World News online publication about lifelong learning, “continuous skilling will be required of college and university graduates. Employees will need to continually upgrade their skills through short-term programs and stackable credentials.”

The article from the University World News titled, “Learning should be lifelong, not end at graduation” went on to describe a World Economic Forum report, ‘The Future of Jobs,’ one of the forum’s conclusions is that the primary driver of change in global business is the evolution of flexible working environments populated with employees with critical thinking and adaptable and flexible skills.

In their report, The State of Workforce Transformation, Udacity conducted a survey of more than 600 learning and innovation leaders across institutions in North America. The survey revealed that business leaders are united in the belief that their organisations must reskill employees to master new technologies.

An astonishing 87% of respondents believe workforce development is critical; while 83% also concluded that they have a troubling skills gap in their organisations.

Key findings from the QS Global Employer Survey and the QS Applicant Survey 2018 report reveals that the skills gap of college and university students is a global and widespread issue and exists across regions and countries, posing a challenge to employers around the world.

Apart from alumni who return to pursue postgraduate study at the masters and doctoral level, most college and university graduates have little educational interaction with their alma mater throughout the rest of their lives.¹⁰

Implications for planning your career paths: A lifelong learning mindset.

One of the commonalities that these diverse future workplace scenarios suggest is the need to adopt a lifelong learning mindset throughout your career and life to best position yourself given your changing interests, your career aspirations, or unforeseen life events that affect your job and career path.

Being enrolled in a master’s degree program means you believe that technical and transferable skills are needed for now, but how might a learning mindset prepare you for the future?

How would you answer these questions:

1. Are you a lifelong learner?
2. Why might having a lifelong learning mindset be important?
3. What are the characteristics of a lifelong learning mindset?
4. Is becoming a lifelong learner something a master’s degree teaches?
5. How can lifelong learning prepare you for more rewarding short-term and long-term career outcomes described in future workplace scenarios?

6. Would being a lifelong learner enhance your ability to be a more successful player in the game of life?

Great questions! And ones we hope to answer throughout this playbook!

Wikipedia defines lifelong learning as the “ongoing, voluntary, and self-motivated pursuit of knowledge for either personal or professional reasons. It is important for an individual’s competitiveness and employability, but also enhances social inclusion, active citizenship and personal development.”¹¹

How might you apply this thinking to your career? As initially mentioned in the Wall Street Journal article, you might need to start planning for your 60-year career lifespan!

The act of continual learning throughout your life furthers you on your path toward self-actualization, which is inherently rewarding and motivating.

“Education is not preparation for life; it is life itself.” John Dewey

The Lifelong Learning Mindset Skills: What can you do?

What are the characteristics of lifelong learners? In the article “Seven Essential Elements of a Lifelong-Learning Mind-Set,” McKinsey outlines the capabilities needed to develop and stay relevant in your career.¹²

1. *Focus on growth, adopt a growth mindset.*

Over the past 30 years, Carol Dweck, a psychologist at Stanford University, studied learners and determined there are two learning mindsets, a fixed mindset and a growth mindset. Each has implications for moving forward in terms of behavior and lifelong learning.

People with a fixed mind-set believe that their learning potential is predetermined by their genes, their socioeconomic background, or the opportunities available to them. They might have thoughts like, “I’m not good at public speaking, so I should avoid it.”

Those with a growth mindset, however, believe that their true potential is unknown because it is impossible to foresee what might happen as a result of passion, effort, and practice. They appreciate challenges because they see them as opportunities for personal growth. Ultimately, they may achieve more of their potential than someone with a fixed mindset.¹³

2. *Become a serial master*

Traditionally, workers develop deep expertise in one area and over time supplement this knowledge to develop strong competencies in their jobs referred to as a T-shaped profile.

Longevity has made this approach obsolete. Since 1840, life expectancy has increased three months for every year, meaning that people are staying, and will continue to stay, in the workforce longer. Because of this trend, today, they need depth in different areas of

expertise, supplemented with targeted on-the-job development, to stay relevant. Today knowledge should resemble an M-shape or profile.¹⁴

Relevant skills have become currency in the workplace. Achieving mastery in several areas will set professionals apart.¹⁵

This additional mastery will require a willingness to adopt a lifelong learning mindset.

3. Stretch.

Working outside of your comfort zone is not always a bad thing.

When people work on tasks that aren't entirely comfortable, they are said to be in their learning zone, where they acquire new knowledge and develop and practice new skills.

When people start a new job, they will likely experience a steep learning curve in which their knowledge and skills increase rapidly. Their progress and the business impact of their performance may be somewhat limited. But after a time, they reach an inflection point where their understanding, competence, and confidence suddenly accelerate very quickly, and they have an increasing impact on the business.

Continuing in the role for a bit longer, the excitement of the new role has worn off, personal learning and development have stalled, tasks and activities have become automatic, boredom has kicked in, and their impact on the business has slowed down significantly.

If people stay in their comfort zone—not seeking out new challenges or new roles—their performance may suffer, and they might even be replaced. Lifelong learners, however, can avoid this pitfall and find new ways to stretch by starting a new learning curve. And organizations can help keep employees on track by providing learning and stretching opportunities at timed intervals.¹⁶

4. Build a personal brand.

Everyone has a professional brand, whether it's a carefully crafted expression of who they want to be or simply the impression they make on others. A brand communicates a person's value and provides a focus for personal learning and development. A brand that defines a person's best elements and differentiates him is essential in achieving career goals—and in demonstrating his accomplishments, both to potential employers and current colleagues. When colleagues understand who a person is and what unique capabilities they bring to the table, that person is more likely to receive interesting new assignments or be considered first for new positions.

A personal brand is not static—it should evolve over the course of a career. Since most people develop new skills and play different professional roles, they will need to rebrand themselves multiple times. Lifelong learners use the process of building a brand to think through what skills they have and which ones they should develop to make themselves

more marketable—both within the company and beyond. L&D professionals can counsel people in this process and provide a way for them to develop the necessary skills.

5. Own your development.

You are responsible for your own development. Lifelong learning will facilitate your development, professionally and personally.

People today expect to work for many organizations throughout their careers—and maybe even for themselves at times. To maintain forward motion in an environment that lacks continuity, people need to own their development and take charge of their learning through the following actions.

Create and execute learning goals. *To become and stay successful, people need to ask themselves, “How can I ensure that I’m more valuable at the end of a year than I was at the beginning?” Individuals can create learning goals by assessing their current knowledge and expertise and identifying competency gaps. They should also plan to pursue the most important learning goals relentlessly, a trait that can become a competitive advantage.*

Measure progress. *People should periodically reflect and assess their progress. Learning journals or logs in which people can track what they learn have proved to be extremely valuable.*

Work with mentors and seek feedback. *Lifelong learners can forge a relationship with a mentor by letting different stakeholders know that they are open to feedback and by setting up formal check-ins to review their work and collect feedback. Feedback from supervisors, peers, direct reports, customers, and clients is a critical component of professional development.*

Make personal investments. *The level of learning required for individuals who want to retain a market-relevant skill set exceeds the amount of formal and informal learning hours that most organizations offer their employees. Therefore, people need to make more personal time and financial investments in their growth and development.*

6. Do what you love.

Learning should fuel your passions.

Most people are in the workforce for 40 to 50 years, and they spend a lot of their waking hours at work. As such, work has a huge impact on a person’s health and well-being, so it’s imperative that people do what they love.

Of course, everyone’s journey of discovery will be different. What’s more, the meaning of work depends on how we view our work—our motivation as well as the objective of the work. There are different ways to look at the meaning of work.

Exploring career purpose, meaning, and passion is not easy. It takes intentional reflection and planning. Individuals can also seek guidance from a career counselor or explore life design. Life design is a concept emerging from career choice and development theories as a method to help people explore and develop their identity and deliberately design a life that will give them meaning.¹⁷

7. Stay vital.

Being healthy contributes to your achievements. Learning how to be healthy plays an important role in ensuring your good health over the course of your life.

The ability to stay vital can contribute significantly to a person's development. This goal demands that individuals make health and well-being a priority—paying attention to exercise, nutrition, sleep, and relaxation (for example, mindfulness and yoga) and developing good, sustainable habits, development of trusted relationships and more.

Longevity in the workforce requires reinvention and growth. A reservoir of energy to support this hard work will help set individuals on the path to lifelong learning and provide the resilience needed to sustain these efforts.¹⁸

Other strategies?

Sarah Briggs, an author at InformED provided a list of 25 lifelong learning strategies that describe concrete activities for how to enhance learning behavior.

1. Begin with the end in mind.

When you approach a new concept or subject, don't think of it as an isolated learning experience. Think of it as a new territory you've begun to conquer. More than likely, you will find in the future that you'll have many uses for it that weren't obvious to you during your initial studies, so think of each learning experience as an investment rather than a one-time transaction.

2. Accept responsibility for your own learning.

We've all had bad teachers and various obstacles that prevented us from sailing smoothly through formal education, but ultimately, we are responsible for our own learning outcomes. This becomes clearer than ever when formal schooling ends and adult life begins. The knowledge you cultivate is directly related to the effort you put into gaining it.

3. View challenges as opportunities for growth.

Challenges excite lifelong learners. Why? Because lifelong learners see challenges as learning opportunities and, ultimately, a chance to enhance their own competence and intelligence. Relishing challenges is one of the most distinctive differences between people with growth versus fixed mindsets.

4. *Have confidence in yourself as a competent, effective learner.*

You may have had trouble performing well in school, or maybe you feel that you have a poor memory and can't soak up all the facts that other people can. The first step towards correcting this is to combat it first-hand. Improve your memory with puzzles and reward yourself when you do perform well now. Have the confidence to say you can become a competent, effective learner—through a growth mindset—if you aren't already.

5. *Create your own learning toolbox.*

What personal learning strategies do you use? Do you listen to podcasts, jot down notes, draw concept maps, or rehearse what you've learned aloud? What's your routine like? Do you enjoy reading the news in the morning while you drink your coffee? Skim the Twitter headlines during your lunch break? Study French after dinner? Identify the tools you use to promote your own learning and create new ones to add to your collection. Being aware of how you learn is an important part of being an effective lifelong learner.

6. *Use technology to your advantage.*

Mobile learning has never been more possible. Take advantage of it! You are what you do, so make a habit of using technology to boost your skills and knowledge on a daily basis.

7. *Teach/mentor others.*

If you can't explain what you've learned to someone else in a way they can understand, then you probably don't really understand it yourself. Sharing knowledge with others is an excellent way to reveal your own strengths and weaknesses and really lock learning into place.

8. *Play.*

You've heard of the "importance of play," maybe a little too frequently lately, and it's essential not only to immediate, short-term learning but also to lifelong learning. Keep it fun and it will remain interesting as well.

9. *Look at the science.*

One thing that might be keeping you back from learning new things is the belief that you can't learn new things. But neuroscience and psychology have shown this to be false. Our brains remain plastic and malleable well into old age, and it's possible to create new connections among neurons and learn new things even if you're 80 years old.

10. *Try new things on a frequent basis.*

Trying new things not only keeps our brains sharp but also feeds the growth mindset. When you broaden your perspective, you start to realize there's far more left to learn about the world than you ever imagined.

11. *Learn from those who have a strong growth mindset.*

Surround yourself with people who are constantly learning, reading, sharing, discovering. It will inspire you to do the same for yourself.

12. *Design personal learning goals.*

It always helps to have a plan. Sure, one of the best things about learning is that you're free to explore any topic, any time you want. But mastery feels good. That's why some of us decide to learn Italian in six weeks or memorize all the decimals in Pi. Identifying and visualizing goals helps us become driven, effective learners.

13. *Talk about what you've learned.*

This one becomes increasingly important as you meet people throughout adulthood. We all want to sound educated and informed to others, and lifelong learning ensures that we will. Be sure to use what you learn in conversation.

14. *Always have an answer to the question, "What are you reading?"*

It can be a series of articles, a short story collection, a novel, a memoir, a textbook. Anything, as long as you're invested and willing to learn.

15. *Keep a "to-learn" list.*

It can consist of entire languages or quirky facts, as long as it's yours. There's something permanent-feeling about writing something down—try it, you'll see the difference.

16. *Ask questions when you're confused.*

Many of us think asking questions is a sign of ignorance, but I say it's a sign of maturity. If you are confident enough in your own intelligence to speak up when you need clarification, you'll have no trouble becoming a lifelong learner—and you'll know more than you did if you'd been too shy.

17. *Practice thinking for yourself.*

Albert Einstein once said, "Any man who reads too much and uses his own brain too little falls into lazy habits of thinking." Simply studying the wisdom of others isn't enough, you have to think through ideas yourself. Spend time journaling, meditating, or contemplating over ideas you have learned.

18. *Put it into practice.*

Skill-based learning is useless if it isn't applied. Reading a book on C++ isn't the same thing as writing a program. Studying painting isn't the same as picking up a brush. If your knowledge can be applied, put it into practice and create something.

19. *Filter your information stream.*

There's a lot of information out there, much of it unreliable or presented in a way that seems new but actually repeats what you already knew. Lifelong learners know when to pay attention and when to say, "Next, please."

20. *Learn in groups.*

Some of us don't like doing this—it reminds us of group projects in school. The truth is, learning with others is often more rewarding than learning on your own. For one thing, you get to see how other people interpret the same information in different ways, which is priceless information in and of itself.

21. *Unlearn assumptions.*

We all have long-held assumptions about the way the world works (or doesn't work). To be lifelong learners, we need to be open to every and all possibilities. The world changes rapidly each decade, year, month, day—can you keep up?

22. *Choose a career that encourages learning.*

Pick a career that encourages continual learning. If you are in a job that doesn't have much intellectual freedom, consider switching to one that does. Don't spend forty hours of your week in a job that doesn't challenge you.

23. *Have projects and hobbies.*

*It seems like a simple idea, but the truth is, projects and hobbies can easily slip away from us when we're not looking. And we tend to fall into patterns of low variety. Sure, you can learn plenty watching *Breaking Bad* every at night after work, but what if you also pick up knitting or read a Shakespeare play every other morning? It will only feel like work until you've slipped into a routine (which usually doesn't take long).*

24. *Learn something new every day.*

For two and a half years, Jeremy Gleick, a sophomore majoring in bioengineering at the University of California, Los Angeles, has devoted an hour a day to learning something new. His rule: It can't be related to schoolwork, or merely reading a novel. Even if he's sleeping at a friend's house, he squeezes in his hour. "At some point in the evening, I just excuse myself and go do it." He recently passed his 1,000th hour of self-study, most of it done online.

25. *Improve your memory.*

If you can't remember what you've learned, learning can be frustrating. There are plenty of techniques available to help improve your working memory capacity so that you can recall more of what you've learned. Try the card game "Set" for starters.¹⁹

How is higher education currently supporting the life-learning mindset?

A lifelong learning mindset is both beneficial and worthy but requires both teachers and students to engage in attitudes and behaviors to make it become a habit. What academic structure is currently available to provide for lifelong learning?

There are currently 12 types of “continuing education” that can be used to boost your career by supporting your career plans. This list and these descriptions are provided by Indeed.

1. *Post-secondary degree programs. A common form of continuing education. Post-secondary degree programs include associate degrees, master’s degrees and other degree programs. Earning a post-secondary degree can be key to advancing your career.*
2. *Professional Certifications. Earning professional certifications can help you advance your career and learn new skills. You can also list your certifications on your resume to appeal to recruiters and expand your pool of job options.*
3. *Independent Study. Independent studies are courses that you can design to fit your specific interests and goals. You often work with a professor or another academic professional.*
4. *Professional Events. Events can take place through employers, professional organizations and other entities in your industry. Some common professional events include conferences, seminars and workshops.*
5. *On-the-Job Training. This option is additional training that you can complete after you get hired. On-the-job training can help you learn new skills and knowledge that you can apply to your current job and use throughout your career.*
6. *Volunteering. You can search for a variety of volunteer opportunities that allow you to learn more about your industry, practice skills and gain experience. Volunteering can also be an opportunity to create professional connections.*
7. *Research. If you work in academia, performing research may be a valuable component of your role. You can choose a research topic that relates to your career and specialties. After completing your research, you can try to publish a paper or study. This can help you improve your career credentials and learn more about your specialty at the same time.*
8. *Online Courses. Often you can search for free or affordable online courses. You can use a search engine to find courses that suit your specific interests and goals. Often you can work through online courses at your own pace.*
9. *Professional License Renewal. You can also complete training, classes and examinations necessary to renew your professional licenses. For example, if you work in certain industries or jobs, you may need to periodically complete additional training to renew*

your licenses. This process can help you remain up-to-date with essential skills and knowledge for your profession.

10. *Language Learning. Knowing multiple languages is a career skill valued across industries. You can list different languages and your skill levels on your resume. You can also choose to learn a language for enjoyment or other personal reasons. Some ways to begin learning a language are signing up for an online course and downloading a language learning app.*
11. *Continuing Education Unit Courses. A continuing education unit (CEU) is a credit unit that equates to 10 hours of a certification program. Therefore, CEU courses can be useful to professionals who need licenses or certifications. You can take a variety of CEU courses through academic institutions and online.*
12. *Extension Courses. Extension courses are courses that colleges and universities offer to people who are not enrolled as students. You can take an extension course to further your career, learn new skills or work on your personal development.²⁰*

The Rutgers MBS Degree Program is a model for a lifelong learning mindset.

The Master of Business and Science Playbook incorporates Stanford University’s “Design Your Life” training described in several books by Bill Burnett and Dave Evans that can be found in the Notes section of this chapter.²¹

In addition, coaches help you coordinate your curriculum and experiences while you are attending the MBS degree program. Also, Chapter 9 provides the Independent Development Plan.

However, this is not a one-time-only guide for how to take advantage of the MBS degree program—this is the beginning of providing you with a lifelong learning mindset for how to continuously evolve your interests, capabilities, and contributions to grow and achieve your career and life aspirations. What changes over time are the questions you need to ask and how you reframe your attitudes and behaviors to fit the evolving contexts.

All the individuals you met or will meet during the program, i.e., executive coaches, advisors, alumni, faculty members, and staff are available for conversations to help you evolve your thinking and plans if you get stuck. You may even find that a “wild and crazy odyssey idea” that you dreamed up as something you always wanted to do but didn’t pursue may not be so crazy after all in a working life that is 60 years long. These MBS members can coach you on how to make that a reality.

The MBS degree program provides career planning from the beginning, not just at the end. The business courses convey material not only for current use but also provide questions that you can apply to evolving future career-making decisions. Our career planning also helps you chart your path through MBS, helping you decide which courses will propel you in your individualized career path currently and beyond.

Networking with current faculty, staff, students, and alumni is a way to maintain relationships that will support and guide future life-learning recommendations. The Industrial Advisory Board (IAB) is a group of STEM-based business leaders and alumni who use their expertise to shape and keep the MBS curriculum ever-current. They also do this through webinar presentations and meetings to provide mentoring advice to graduates and alumni throughout the course of their careers. The Professional Women’s Group provides opportunities for advice that furthers a lifelong learning mindset.

In the MBS degree program, we encourage upskilling and reskilling if needed—we keep a close eye on workforce data to know what skills are in demand so that our students are well-equipped for the workforce. As innovators and developers of this program, we talk to other experts and ask what skills and projects they see on the horizon to understand what you will need in five years so that you can start mastering them while in the program. And we hope that through this example, you will learn how to look into the future to plan for your future.

To have successful and fulfilling careers, students need to commit to lifelong learning to stay on top of these emerging and changing skills. As illustrated in the WSJ “60-year career” article, we also need to remain lifelong learners to adapt to the career landscape. In general, we encourage students to chart their own path to success, step outside of their comfort zone, and try new things—a lifelong learning mindset is needed for all of these. Graduates return to our program for continuing education courses, to add to their level of expertise or refresh, and to get certificates needed for their job advancement or enhancement.

MBS recently started a blog series called “Life Outside the Classroom,” where professors are interviewed about their hobbies or businesses that are unrelated to what they teach. This is an example of lifelong learning, i.e., seeing professors continue to try and learn new things, and this can help bring a new perspective to the work that they’re currently doing. One professor described it as an exercise for the part of his brain that he didn’t normally use.

In these numerous ways, the MBS degree program supports a “growth mindset” approach that fuels a lifelong learning mindset. More will be revealed in detail as you progress through the playbook.

MBS “Differentiators”

As you will see in the chapters that follow, the MBS degree program has taken the idea of creating a lifelong learning mindset very seriously. The program reformatted the traditional master’s to incorporate course differentiators to facilitate a lifelong learning mindset by providing tools and experiences that you can use throughout your career.

Those differentiators include revamping leadership from a class to a mastery of skills you are practicing all the time, attending colloquia to remain relevant, acknowledging the importance of networking for creating opportunities, providing professional executive coaches to help you become your best self, having you choose and adapt their course and elective curriculum based on your work goals and to manage career surprises, and incorporating the MBS Playbook Plan

with advising. These and other tools and experiences will all be explained in more detail in the chapters to follow.

Why is there so much emphasis on these “differentiators” and why did we add flexibility? Flexibility is represented by allowing you to take the program full or part-time, online or in-person/hybrid. This flexibility is of great importance because the primary aspect of a master’s degree program is for you to learn how to learn and to learn continuously. This is what will serve you best in the long run.

The MBS degree program is about learning a lifelong learning process as much as it is progressing through classes and experiences. The MBS degree program is meant to be the “course guide” and template for creating a lifelong learning mindset that can be repeated continuously to benefit you throughout your life.

You lead your ship. Your learning success is the result of you taking full advantage of the MBS degree program and your personal investment and commitment to it.

$$\text{Learning Success} = f(\text{MBS} * \text{You})$$

Summary

There is power in a growth mindset supported by a lifelong learning strategy. Adopting this mindset differentiates you from other job applicants rewarding you with getting the job and desirable opportunities.

Not only will a growth mindset with lifelong learning strategies provide you with a model for determining your next career opportunity, but this mindset will serve you well on your pathway to a self-actualized career even if you have a 60+ year one!

All the “Plays” for the MBS degree program provided in the chapters of this Playbook help support a lifelong learning mindset as described above. The Plays result from the MBS curriculum and experiences but are generalizable to your current and future career and life aspirations.

The Plays

Play 1: Take the Lifelong Learning Survey below. (Derived from the McKinsey⁷ and Briggs¹⁹ articles found in the Notes section of this chapter.

LIFELONG LEARNING SURVEY

Instructions: To be filled in (without looking at the next page). There are no right or wrong answers. Your answers are confidential.

1. Please provide your definition of a “lifelong learning mindset.”
2. Why is having a lifelong learning mindset important or not?
3. What are some ways of thinking or behaving that represent a “lifelong learning mindset” for you?
4. In thinking about your future, how does a lifelong learning mindset benefit you and your career development?

Instructions: Please indicate if you do this behavior on a regular basis. Please circle “Yes” if you do this on a regular basis (or believe it strongly). If not, please circle “No,” I do not do this behavior on a regular basis (or do not believe this strongly). Explanations are provided below to the questions to help if needed.

I do (Yes) or I do not (No) do this on a regular basis...

1. Focusing on growth and adopting a growth mindset. Yes No
I have a growth mindset because I believe that my true potential is unknown and because it is impossible to foresee what might happen as a result of passion, effort, and practice. I appreciate challenges because I see them as opportunities for personal growth.

This is different from people who have a fixed mindset and believe that their learning potential is predetermined by their genes, their socioeconomic background, or the opportunities available to them.

2. Becoming a serial master. Yes No

I am developing deep expertise, primarily in one area, and over time supplement this knowledge to develop strong competencies in my jobs.

3. Developing stretch goals. Yes No

I think working outside of my comfort zone is not always a bad thing.

4. Building my personal brand. Yes No

I am building a personal brand that could change over time.

5. Owning my own development. Yes No

I am responsible for my own development in lifelong learning that will facilitate my development, professionally and personally.

6. Doing what I love or am good at. Yes No

I think that learning should fuel your passions.

7. Staying vital. Yes No

Being healthy contributes to my achievements. Learning how to be healthy plays an important role in ensuring my good health over the course of my life.

8. Beginning with the end in mind. Yes No

When I approach a new concept or subject, I don't think of it as an isolated learning experience. I think of it as a new territory to begin to conquer. More than likely, I find in the future that I'll have many uses for it that weren't obvious to me initially, but each learning experience is an investment rather than a one-time transaction.

9. Accepting responsibility for my own learning. Yes No

We've all had teachers and various obstacles that prevented us from sailing smoothly through formal education, but ultimately, I am responsible for my own learning outcomes. This becomes clearer than ever when formal schooling ends and adult life begins. The knowledge I cultivate is directly related to the effort that I put into gaining it.

10. Viewing challenges as opportunities for growth. Yes No

I am excited by challenges as learning opportunities and, ultimately, a chance to enhance my own competence and intelligence. Relishing challenges is one of the most distinctive differences between people with growth versus fixed mindsets.

11. Having confidence in myself as a competent, effective learner. Yes No

I may have had trouble performing well in school, have a poor memory, or can't soak up all the facts that other people can. I have worked on improving my memory with puzzles and reward myself when I do well. I have the confidence to say I became a competent, effective learner—through a growth mindset.

12. Creating my own learning toolbox. Yes No

I have developed personal learning strategies, for example, by listening to podcasts, jotting down notes, drawing concept maps, or rehearsing what I've learned aloud. I've identified tools to promote my own learning and am creating new ones. Being aware of how you learn is an important part of learning.

13. Using technology to my advantage. Yes No

Mobile learning has never been more possible. I have made a habit of using technology to boost my skills and knowledge on a daily basis.

14. Teaching /Mentoring others. Yes No

Sharing knowledge with others is an excellent way to reveal my own strengths and weaknesses and really lock learning into place.

15. Playing. Yes No

I believe in the "importance of play," and try to keep it fun and interesting.

16. Believing in neuroscience findings about brain elasticity. Yes No

Neuroscience and psychology have shown our brains remain plastic and malleable well into old age. It's possible to create new connections among neurons and learn new things even if you're 80 years old.

17. Trying new things on a frequent basis. Yes No

Trying new things not only keeps my brain sharp but also feeds my growth mindset. By broadening my perspective, I started to realize there's far more left to learn about the world than I ever imagined.

18. Learning from those who have a strong growth mindset. Yes No

I surround myself with people who are constantly learning, reading, sharing, and discovering. It inspires me to do the same for myself.

19. Designing personal learning goals. Yes No

It always helps to have a plan and mastery feels good. That's why I've decided to learn something new at regular intervals. Identifying and visualizing goals helps me become a driven, effective learner.

20. Talking about what I've learned. Yes No

This is increasingly more important as I meet people throughout adulthood. I am learning to feel comfortable in sharing what I've learned in conversation.

21. Always having an answer to the question, “What are you reading?” Yes No
I am always reading. It can be a series of articles, a short story collection, a novel, a memoir, or a textbook. It shows what I am invested in and willing to learn.

22. Keeping a “to-learn” list. Yes No
My list can consist of entire languages or quirky facts. There’s something permanent-feeling about writing something down—I see the difference when I do it.

23. Asking questions when I’m confused. Yes No
Many of us think asking questions is a sign of ignorance, but I say it’s a sign of maturity. If you are confident enough in your own intelligence to speak up when you need clarification, you’ll know more than you did if you’d been too shy.

24. Practicing thinking for myself. Yes No
Simply studying the wisdom of others isn’t enough; you have to think through ideas yourself. I spend time journaling, meditating, or contemplating over ideas I’ve learned.

25. Putting my skills into practice. Yes No
Skill-based learning is useless if it isn’t applied. Reading a book on C++/computer language isn’t the same thing as writing a program. Studying painting isn’t the same as picking up a brush. If my knowledge can be applied, I try to put it into practice and create something.

26. Filtering my information stream. Yes No
There’s a lot of information out there, much of it unreliable or presented in a way that seems new but actually repeats what I already know. I try to pay attention to what is being said and know when to move to the next topic.

27. Learning in groups. Yes No
Learning with others can be more rewarding than learning on my own. For one thing, I get to see how other people interpret the same information in different ways, which is priceless information in and of itself.

28. Unlearning certain assumptions. Yes No
We all have long-held assumptions about the way the world works (or doesn’t work). I want to be open to every and all possibilities. The world changes rapidly each decade, year, month, and day—and I challenge myself to keep up.

29. Choosing a career that encourages learning. Yes No
I try to pick careers that encourage continual learning. I don’t want to spend forty hours a week in a job that doesn’t challenge me.

30. Having projects and hobbies. Yes No

Projects and hobbies can easily slip away from me when I'm not paying attention to them. I try to keep my projects and hobbies fresh and varied.

31. Learning something new every day. Yes No
I believe in the benefits of trying to learn something new every day.

32. Finding methods for improving my memory. Yes No
I am always looking for ways to improve and to try to improve what I've learned.

Now tally up the number of "Yes" and "No" responses and proceed to Play 2.

Play 2: Which lifelong learning mindset characteristics do you regularly practice? Which ones would you like to practice more?

Play 3: How would you begin to think "big picture" about your career that spans 10, 20, and 60 years?

1. What can you imagine your career trajectory would be over the course of 10, 20, 60+ years?

2. What are the possible questions you will need to answer?

3. What are the structures and strategies that would facilitate a successful growth strategy for your lifelong career plans and decisions?

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Chapter 2

The Master of Business and Science Degree Where Science Meets Business (Finally)

“No great discovery was ever made without a bold guess.” Isaac Newton

The Rutgers Master of Business and Science degree program was a bold, new discovery. It turned out to be a rewarding, exciting one for MBS students who expressed below its benefits not previously offered by any other degree program.

“When I entered the program my end goal was to get a job. But I ended up getting the job I had only dreamed of. My dream became a reality!”

“You have to evolve and adapt. There is nothing else like it. I’m so excited to talk about it. It’s so cool and bragworthy.”

“It’s one of the best experiences of my life. I learned you get what you put into it. It really changed me.”

“It gave me an edge and the confidence to walk in the door of the foundation.”

“I knew what I wanted but hadn’t thought through how to make it come true. I had to learn new things!”

“When I started, I was curious, ambitious, looking for growth and to prove myself. Looking back, I became an advisor, teacher, expert. It gave me problem-solving skills, creativity, most importantly, the skill of finding connections between the right people. It was shining a light on my inherent value for everyone to see that was clearly not seen before.”

“I started naïve. I had never worked before. But after, I was totally different. A stronger, better visionary person. I had taken on challenges. I could do any job. I had the confidence to achieve based on what the degree created.”

Whether you are a scientist, creator, discoverer, entrepreneur, pioneer, designer, developer, builder, teacher, manager, practitioner, or anything in between, this playbook provides you with the reasons, plans, and tips to help you discover and achieve your career and perhaps life dreams. To move from “I am” to “I want to become.”

How can we assert this? Why do we know? We are sharing with you the stories, experiences, and lessons learned from hundreds of faculty, staff, students, alumni, and employers who, over the course of the past thirteen years, contributed their time and talents to the Master of Business and

Science Degree program. We couldn't keep these great ideas and experiences to ourselves but instead wanted to share them so that you could benefit from them as have so many others.

Why all the excitement about an offering that brings STEM specialists (i.e., scientists, technology, engineers, and mathematicians) together with businesspeople, particularly in an academic setting? Let's first start with a comparison of the broad areas of science and business disciplines.

What is science? Understanding the physical and natural world.

The Science Council defines it as:

Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence. The scientific methodology includes the following:

1. *Objective observation: measurement and data (possibly although not necessarily using mathematics as a tool)*
2. *Evidence*
3. *Experiment and/or observation as benchmarks for testing hypotheses*
4. *Induction: reasoning to establish conclusions drawn from facts or example*
5. *Repetition*
6. *Critical analysis*
7. *Verification and testing: critical exposure to scrutiny, peer review and assessment¹*

What is STEM?

In the MBS degree program, the use of "science" includes STEM. What is STEM? Wikipedia states,

Science, technology, engineering, and mathematics (STEM) is an umbrella term used to group together the distinct but related technical disciplines of science, technology, engineering, and mathematics. The term is typically used in the context of education policy or curriculum choices in schools. It has implications for workforce development, national security concerns (as a shortage of STEM-educated citizens can reduce effectiveness in this area), and immigration policy, with regard to admitting foreign students and tech workers.²

What is business? Delivering goods or services to the marketplace.

Investopedia defines business as:

The term business refers to an organization or enterprising entity engaged in commercial, industrial, or professional activities. The purpose of a business is to

organize some sort of economic production (of goods or services). Businesses can be for-profit entities or non-profit organizations fulfilling a charitable mission or furthering a social cause. Businesses range in scale and scope from sole proprietorships to large, international corporations.³

What happens when science meets business?

As these definitions indicate, the worlds of science and business are distinct. What they seek to understand is different, what they produce is different, and who they speak to is different. This is particularly apparent in academia and graduate degrees.

And yet, for job and career seekers, being able to bring these two worlds together, i.e., science (understanding the world) and business (delivering to the world) by bridging the gap with a shared language and fluency, is essential. Knowing both helps enhance the understanding and communication of what is needed to create, develop, and deliver the desired goods and services to industrial, commercial, or professional customers.

With so few programs providing this offering, this enthusiastic reaction was totally understandable from MBS students:

“It was the best of both worlds. I became fluent in science and business. This program helped me bridge the gap.”

“I walked away with new skills, went much farther than I thought and got the confidence to help me step outside of my comfort zone.”

“They looked at me in the interview and said that person stood out.”

The purpose of this Master of Business and Science Degree playbook is to show how bringing science and business together in the academic setting creates successful outcomes for all, i.e., the student, the university, the community, and the marketplace.

Creating the Master of Business and Science Degree Program: Academic Innovation.

The Situation. A question was identified.

2008

In the beginning, while Rutgers was renowned for its prestigious, STEM-based graduate courses and its reputation as a research powerhouse, there were no programs that could adequately address a growing need in the STEM industry workforce for those who wanted to break into a science field, advance in their careers or try something new. This was ironic as New Jersey was, at the time, considered to be the pharma state. It was also close to New York, where numerous chemical, pharmaceutical, tech, and engineering companies were located.

2009

Dr. Deborah Silver, a full professor in engineering at Rutgers, was increasingly connecting with private industry through her research and continuing education efforts. Based on these experiences, she wondered where the working STEM professionals in New Jersey were going for graduate education. Were they continuing to take science classes?

This question was one of many posed by a small but dedicated group of colleagues who, like her, were aware of a major education gap impacting both STEM-industry employers and working professionals alike: employers seeking but not finding candidates with a blend of advanced, science-based knowledge and comprehensive business skills. And STEM professionals seeking advanced, science-based education for non-academic career advancement could not find such programs.

Recognizing this gap, faculty members across the university were starting initiatives within their own departments including Dr. Silver, then Associate Dean of Continuing and Professional Education for the School of Engineering and professor in the Department of Electrical and Computer Engineering.

From her years of building a multidisciplinary research program centered around data visualization—collaborating with researchers across Rutgers and driving millions of dollars of outside support—Dr. Silver knew firsthand the immense value of combining multidisciplinary scientific studies with business education.

Those individuals involved in the program from the beginning shared how exciting the idea was at the time.

“In the beginning we were meeting with people, talking and listening to their concerns, building trust and communicating to show that this was a win-win. The reoccurring question from students was, ‘Will anyone hire us?’ We said, ‘Yes, this is a cutting-edge, revolutionary program that brings science and business together!’”

“Students told us, ‘I want to be taken seriously’. And the IAB members would say, ‘We want to talk to people who have an understanding of business and are not computers.’ So it was so exciting to hear that the proposition worked for both sides. The team knew that it would be successful because it was filling a gap that didn’t exist before. This was important, life changing and the next big thing. We had never seen this happen before.”

“We knew it would work. How did we know it would work? Because students got excited when we told them about bringing science and business together. This is what they wanted. And employers said, ‘Yes, that’s what we are looking for. Now we don’t have to hire two people for this very thing.’”

During this time, Dr. David Finegold arrived at Rutgers after teaching at the Keck Graduate Institute of Applied Life Sciences of the Claremont Colleges, one of the first Professional Science Master’s (PSM) programs in the country. It was clear that the PSM would be a natural fit for Rutgers University. As a premier research institution with numerous high-level graduate programs in the sciences, Rutgers also boasted geographic proximity to major national employers.

Silver and Finegold eventually connected, and through collaborative efforts, they developed a nascent but focused initiative to officially establish a PSM program at Rutgers. Through outreach to colleagues, Silver ultimately assembled a comprehensive, multidisciplinary task force and advisory team composed of faculty experts from such wide-ranging disciplines as engineering, computer science, biotechnology, drug discovery, food science, chemistry, environmental sciences, business, and entrepreneurship.

The MBS “originating team” knew the program would be successful.

“Dr. Finegold was the founder. He got the seed money. He had impeccable credentials and was a brilliant man.”

“Both Dr. Finegold and Dr. Silver had a vision and knew this program was worth doing. They were coalition builders. It was a collaborative effort.”

“Dr. Silver knew how to work with others to get things done. She worked very well with others to bring everyone along.”

“Even in the beginning she knew how to grow the program. There were flyers all over the place. Lots of open houses and we would talk about the benefits of the program. We said this degree gives you enormous rewards unlike no other when you bring science and business together. Having both experiences will help you get to the top of the ladder. It’s the best of both degrees rolled into one.”

The Objective. Drs. Silver and Finegold developed a Professional Science Master’s Program.

The solution was to create a PSM program at Rutgers. Established in 1997 by the Sloan Foundation—an entity dedicated to advancing STEM research and education—PSMs combined advanced STEM-based education with professionally guided business instruction.

A proposal was submitted by Dr. Finegold in 2008 to the Alfred P. Sloan Foundation to fund this effort. The Executive Summary set forth the following objectives.

To develop a new generation of leaders for New Jersey’s heavy concentration of science-based industries, Rutgers, the State University of New Jersey, proposes to create New Jersey’s first statewide set of Professional Science Master’s (PSM) degrees in the life sciences and related disciplines. PSM graduates will have the mix of technical and managerial skills needed to help translate research into practice. Each of the 10 proposed initial tracks in the degree framework will prepare students for high-demand skills within industry. They will learn by doing, working in interdisciplinary teams to help commercialize new technologies, with guidance from faculty, industry experts, and investors.

Moreover, the PSMs are the core of a wider strategy to build a workforce and economic development system for New Jersey’s life science industries. This initiative involves an unprecedented number and level of partnerships: among the many science, engineering,

and professional schools on the Rutgers New Brunswick campus; among the three Rutgers campuses that cover the northern, central, and southern regions of the state; and among the University, educational partners across the state, and employers.⁴

What is the Professional Science Master's Degree?

The Professional Science Master's degree was created specifically to address a gap in graduate education in the sciences—one that equally affected students pursuing advanced degrees for STEM-based careers outside of academia, and industry employers looking for candidates who could effectively combine and apply graduate-level, science-based education with business knowledge.

For both cohorts, a bachelor's degree didn't provide enough advanced scientific training, and the Ph.D. took too long and didn't provide training in essential business skills.

In 1997, The Alfred P. Sloan Foundation, a philanthropic entity that supports broad-based education related to science, technology, and economics, began funding creation of master's-level degree programs for students pursuing non-academic science-based careers.

The Professional Science Master's degree generally combines two years of graduate-level STEM instruction with professional education directly relevant to careers in business and industry, including experiential learning and networking opportunities.

One hallmark of the program—and one of the Sloan Foundation's earliest criteria for funding—is collaboration between university professors and industry employers.

From 1997 to 2010, the Sloan Foundation funded more than 100 PSM programs at more than 50 universities. Rutgers received part of that seed funding to build a university-wide interdisciplinary masters. Our program is part of the Professional Science Master's Network, which as of 2018 was comprised of 345 programs, 157 institutions, 35 states and 4 countries.⁵

Rutgers Master of Business and Science Degree.

In March 2009, Silver was named Executive Director to guide the effort and oversee the state approval process.

2010

Rutgers was officially granted state approval to offer the Master of Business and Science degree. This degree would be offered by the Graduate Schools on all three Rutgers' campuses, New Brunswick, Newark, and Camden. It was the first degree at Rutgers to be set up centrally with the goal of allowing students to take courses anywhere that related to their professional goals.

Resources were needed.

With seed funding from the Sloan Foundation, Department of Education (FIPSE grant), and Bio1 Wired (NJ-based grant labor grant), full efforts to establish a truly collaborative and innovative master's program got underway. Writing a proposal to the National Science Foundation, Dr. Silver outlined how Rutgers' academic excellence, vast resources, and geographic location within a STEM/tech corridor would yield premier science-based graduate education that could fuel entrepreneurship and economic growth in New Jersey. The resulting award of \$700,000 supported the first student cohort, who were welcomed in 2010.

Analysis. Assessing the competitive landscape.

The assessment of this effort represented in the Sloan Foundation application was based on a review of the competitive landscape for PSM and industry needs in New Jersey and the Northeast Corridor.

The PSM is a new type of graduate degree that has emerged in the last decade. It integrates business, science, and (in some cases) ethics education to prepare individuals to commercialize technological innovations and to assume key integrator and leadership roles in science-based industries. There are now more than 100 such programs across the US producing approximately 1,300 PSM graduates annually, with a heavy concentration in life science fields. Most were started with the support of the Sloan Foundation. The National Governors' Association estimates that the national demand for PSM graduates could be up to ten times the current supply and has announced a major initiative to increase states' development of wider PSM systems, building on the recent Cal State system-wide program.

New Jersey is a world leader in many high-technology sectors, with a particular strength in pharmaceuticals and biotechnology. Most major states with large science and industrial bases have PSM programs; New Jersey is among the few that do not. In a bold new initiative, Rutgers proposes to change that; it would create 10+ new PSM degrees under a single Rutgers brand, covering the entire state's needs through programs at its three campuses: Newark, New Brunswick, and Camden. Our recent in-depth analysis of employer needs in the New Jersey life science sector (HINJ, 2007) suggests that PSM programs could meet many of the sector's most pressing skill needs.⁶

Analysis. Identifying the size of the workforce need.

To ground this idea, an extensive analysis was conducted on the employer base in New Jersey, demonstrating the large opportunity for such an effort given the number of headquarters and facilities located in the state.

A thorough analysis was also conducted on the current educational offerings to train the workforce for available jobs, and it revealed an under-prepared workforce for the size of this opportunity.

An interesting anecdote—when Dr. Silver attended Industrial Advisory Boards as part of the Electrical and Computer Engineering (ECE) department, the industry professionals were always asked what courses the ECE department should teach students. The number one answer was always communications, followed by project management. After a couple of years of these answers, the department stopped asking the questions. She said, “I always remembered this as being amusing, and was able to finally use that data for MBS.”

It was the conclusion of the Sloan Foundation submission that,

An example of a current disconnect is the worrying lack of strong business skills among the scientific and technical personnel either already employed or entering the field. In an industry where approximately nine percent of all start-up businesses fail within the first year, and where most companies require 10-15 years to become profitable, the need for people with business acumen, in addition to scientific and technical skills, is critical. The PSM degree offers a means to address this issue by developing individuals with a strong blend of business and technical skills. Our extensive discussions with New Jersey life science employers since the launch of the IPI and WIRED initiatives indicate strong support for the PSM initiative.

And, in addition to the direct benefits of creating cadres of new graduates with the skills needed to integrate science and business, the development of a new set of PSM degrees is at the heart of three broader strategic initiatives designed to spur the growth in high-skill, high-paying jobs in New Jersey: BioPharma skills in New Jersey, efforts to create a high-skill ecosystem in central New Jersey using a \$5.1 million new WIRED (Workforce Innovation and Regional Economic Development) grant from the US Department of Labor and the redevelopment of Rutgers' Livingston Campus.⁷

Key Findings. Identifying a core vision and building the program.

2010 to 2020

When launched in 2010, this degree program combined a graduate-level science master's with a rigorous business curriculum through three overall science tracks. It was affiliated with the National Professional Science Master's network, an organization assuring quality across PSM programs nationwide.

Over the course of the next ten years, with an openness, agility, and growth mindset more characteristic of an entrepreneurial start-up than a university department, the MBS program grew by learning, trying, and applying new features that pleased the marketplace:

1. STEM certified, so that it was science credentialed and the business curriculum was constructed to be highly relevant to industry.

2. Customer-focused and vigilant for what was needed, i.e., for industry (workforce relevant) and for students (providing flexibility to go to school while working).
3. An evolutionary structure created to allow for agility, adaptability, and expansion so that new sciences and concentrations could be swapped in without a lot of red tape delays.
4. Multidisciplinary, not just interdisciplinary, to master, combine, and apply relevant science and business skills.
5. Used design thinking to design, test, and iterate to optimize the outcomes.
6. Leveraged the excitement surrounding it because it was innovative, entrepreneurial, and leading edge. It provided the best of an MBA and MS by helping students to become fluent in science and business to bridge the gap between the two disciplines and become more well-rounded. By turning “knowledge into know-how,” the applied approach made students more useful to the workplace. It seemed differentiated, “nothing else out there like this.”
7. Conveyed a learning environment that facilitated growth, where ideas and strategies could flourish, and permission was given to just do it!
8. Recognized the need for externships as part of experiential learning so that students would have hands-on project-based learning.
9. Represented a culture of respect, caring, and diversity across many dimensions to enhance learning opportunities for students as well as faculty. The program acknowledged the “whole person” by addressing key considerations of time, cost, family, and life, which made the program more relevant, accessible, and motivating.
10. Understood that students wanted a master’s to move ahead professionally, adding executive coaching to ensure that the knowledge could be integrated into the workplace goals and development.
11. Provided non-traditional experiences that were new at the time: capstone, leadership training, Design Your Life, executive coaching, advising/mentoring, networking, internships, externships, and events (mandatory). It was about bringing the outside inside and how to run these efficiently.
12. Directed by Dr. Silver, who was described as “having the ability to find something special, knowing how to create the experience and energizing those experiences.” She made sure that the courses were accessible to working STEM professionals. As a result, the MBS degree program went online considerably before the pandemic. All combined, she empowered, encouraged, and created a culture to learn and grow at all levels.

Key Findings. The science meets business effort was rewarded.

2024

Fourteen years later, Rutgers University can claim one of the most comprehensive PSMs in the nation. It achieved this stature through design, testing, and iterating its unique ideas to address the needs of students and the marketplace.

Operating on all three campuses and originally overseen by the Office of the Senior Vice President for Academic Affairs at Rutgers, the program offers twenty professionally focused concentrations in three major areas: Life Sciences, Engineering, and Computer & Information Sciences.

Its Mission and What We Do:

Our Mission

Our degree, the Rutgers Master of Business and Science (MBS), was established in 2010 to dually serve the needs of New Jersey's working, science-based professionals and support the STEM-based industries of the surrounding New York / New Jersey Metropolitan area.

Our goal is to train the next generation of individuals to assume key integrator and leadership roles in science-intensive industries, thereby helping to fuel innovation, accelerate technological discoveries, and translate science-based research into practical applications and consumer offerings that drive the economic growth of our state.

What We Do

Through an integrated, multidisciplinary, and dynamic curriculum, we meet the STEM industry's ever-changing labor needs by educating a new generation of professionals who can keep pace with rapid workforce changes.

Our unique program combines advanced, STEM-based education with professionally guided business instruction—enabling graduates to step confidently and adeptly into the STEM workforce equipped not only with advanced academic knowledge, but with the business skills essential to professional leadership and advancement.

While the program was originally New Jersey-based, it has expanded its reach across the US through its online curriculum. The STEM-based industry in the New Jersey and New York area is one of the largest in the US and as a result, many different areas benefit from its program.

The Professional Science Master's Program Achievements:

1. The fully self-sustained program continues to expand in breadth and depth. Through an ever-increasing alumni network and strong industry partnerships, the rigorous academic curriculum has been augmented by experiential learning opportunities at some of the world's most prestigious companies.
2. Faculty Excellence. When teaching a professionally based course, MBS utilizes multiple professors so that students are ensured a wide range of practice-related experiences.
3. Student-centric curricula, personalized academic planning, and individualized career coaching ensure that each student's educational journey and personal development culminate in success during our program and beyond. Executive coaches found to be valuable in the business setting have been used in the program since the beginning, which is a novel concept in an academic setting. Our advisors and executive coaches continue to offer their expertise and serve as valuable resources to our students well beyond graduation and have established an ongoing program connection that has greatly

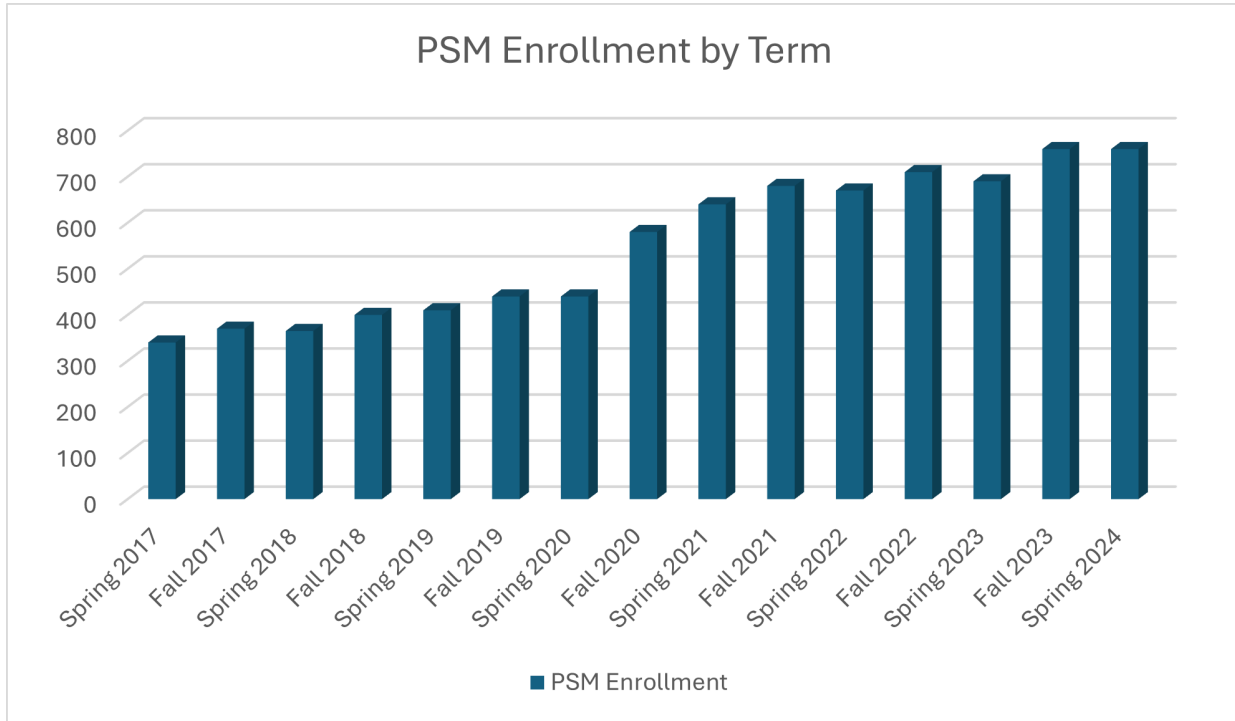
contributed to alumni affinity—yielding a network of graduates who are involved and dedicated to the ongoing success of our program.

4. **Experiential Learning:** Our degree was founded with a link to the industrial ecosystem of the New York/New Jersey Metropolitan area. We continued to maintain this strong connection through an active industrial advisory board with a focus on bringing practitioners into the classroom. As part of experiential learning, we recognized the need to enable our students to have hands-on, project-based learning, so we established externship and internship programs. Capstone projects were created to study and analyze labor trends in the New York/New Jersey area. A key guiding principle: “Knowledge is a commodity; know-how is an asset.”
5. **Comprehensive Educational and Career Guidance.** Advisors and executive coaches work individually with each student to understand their science professional goals and help them personalize their curriculum journey. The students have access to other levels of support: alumni mentoring, advising, Design Your Life training, networking, events, and lectures.
6. **Strong Alumni Network.** We have a strong, involved, and active alumni network that provides comprehensive, accessible mentoring and abundant networking opportunities. We have regular student-alumni mixers, and our graduates work for some of the nation’s leading companies.
7. **Human skills training.** As artificial intelligence continues to become more sophisticated, our blended curriculum remains designed to cultivate the very “human skills” that can’t be outsourced: leadership, project management, communication, problem-solving, and the ability to work as part of a multidisciplinary STEM-based team.
8. **Our student body of approximately 800 STEM-based professionals—most of whom work full-time while pursuing their master’s degree—achieves true gender parity and reflects our program’s success in attracting top students at both the domestic and international levels—making this program one of the largest in the country, as well as one of the most diverse and lauded.**
9. **An unprecedented number of integrated, multidisciplinary partnerships among the graduate schools on all three Rutgers campuses but also with a wide network of employers in New Jersey and worldwide.**
10. **Continued research that examines real-time labor trends and STEM workforce demands—enabling the program to constantly keep pace with ever-changing, ever-emerging dynamics during an era of rapid growth and industry shifts.**
11. **A recent grant from the National Science Foundation to investigate, in collaboration with the Council of Graduate Schools, masters’ STEM education and workforce development.**
12. **Our geographic location within the New York/New Jersey STEM-tech corridor helped us cultivate strong business relationships that not only strengthen university-industry ties, but also offer a rich employment landscape for our graduates, who apply their talents at prestigious companies representing the nation’s top corporations: Bloomberg, Merck, L’Oréal, Johnson & Johnson, Nielsen, Sanofi, Mondelez, and PSE&G—contributing to the economy of our state, our nation, and the world. Executive leaders often visit campus to conduct industry-specific lectures and share their expertise through a variety of programs and initiatives.**

The program culture is both bold and dynamic and bodes well for a sustainable program, for the students being served, and for the companies and industries enriched by its graduates' contributions.

Key Findings. Demonstration of its appeal.

The growth over time for the Master of Business and Science (MBS) degree has been impressive. Below are enrollment figures by term.



Summary.

This chapter summarized the historical development of the Master of Business and Science degree program as well as the reasons for its successes and, as a result, provides direction for how you can build your own successful program.

The Plays

Here are a few playbook tips for getting started with building your own career direction and program.

Play 1: The “I am...” to “I want to become...”

The “I am” is a standard exercise in acting classes—where a student stands for 30 seconds to 1 minute to talk about herself/himself, but every sentence must start with “I am”. It’s used at orientation, but you don’t need to present to a group of people for it to accomplish the goal of articulating how you are thinking about where you are right now in terms of your career and life. It is surprisingly hard to do as we can only store about five things to say (that takes 10 seconds, so there are another 20 left).

To begin, just answer these simple questions.

1. Where are you today in terms of your current job or job prospects?
2. How would you describe yourself?
3. What are your values?

After having articulated where you are right now, then answer these simple questions that suggest or lead to where “I want to become.” You are pursuing a master’s to get to somewhere, we want you to think about where that place will be.

1. Where do you want to go? What do you want to be? (Must be actionable and be able to be tracked, otherwise it is just a thought or wish.)
2. What do you need to get from where you are now to where you want to be? (e.g., skills, competencies, etc.)

3. You are here now, what else do you think you need? (e.g., learning, experiences)

4. Provide three job postings or careers you are seeking, two in the near term and one farther out.
 - a. Identify 2-3 job postings for your career you aim to achieve upon graduating. Label the two closest in job postings as “Odyssey 1” and “Odyssey 2.” Label the job/career that is farther out, “Odyssey 3.”
 - b. Evaluate these job postings with your professional goals to identify common skills, competencies, and experiences.
 - c. Classify the skills needed as scientific/technical, business-related, or transferable skills.
 - d. Determine if a skill is one that you already mastered or one that you need to acquire.

Summarize: “I will need these...”

- a. Skills
- b. Experiences
- c. Competencies
- d. Relationships
- e. Courses

You will use these thoughts in later chapters.

Play 2: Lessons learned about how to achieve objectives. Have a growth mindset and “**BUILD IT.**”

What started out as an important question (Where are science students going to get industry skills?) grew until it became an important offering (The Master of Business and Science Degree Program). There was a focus on growth, the adoption of a growth mindset, and an opportunity to address the lack of a good alternative.

Summarizing the efforts in this case study, here’s what you can do to create important outcomes for yourself. Be an innovator, be an entrepreneur, and take the initiative to “**BUILD IT.**”

B = Be brave and bold. “Don’t wait to be anointed!”

U = Understand your audience and their needs.

I = Innovate and then iterate if not successful the first time.

L = Learn from others and build to grow.

D = Design a plan to move ahead even when things look too chaotic.

I = Influence through strategic communication.

T = Think to thrive, be true to yourself, and trust it can happen.

CHAPTER 2: NOTES

Thanks to all those who were interviewed or provided quotes or content for this chapter: David Finegold, Karen Bemis, Kathleen Cashman-Walter, Ines Czechowski, Narayan Escolin, Abbe Rosenthal, Caroline Thorpe, Alycia John, Vicki Pasigos, Judy Pellicane, Julianna Rossano, Supreet Kaur, Robert Warfsman, Aleta You.

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Chapter 3

The Value of a Master's Degree Where Learning Meets Mastering

“The PSM degree is more valuable today than ever before because of technical innovations and new start-ups.” Dr. David Finegold

The master's degree is about *mastery*.

In Chapter 2, we shared the challenges and rewards of building a Master of Business and Science (MBS) degree program. The purpose of this chapter is to share the value, credibility, and reputational importance of achieving a master's degree.

There are numerous reasons why you considered or may be considering pursuing this degree. Those most frequently mentioned: increased earning potential, development of a professional network, the desire to upskill or reskill, preparation for a leadership position within your company, opportunities for accelerated internal career advancement, to launch an entrepreneurial venture or career, and to switch job position, employer, industry, or geographic location.

With the serious commitment of time, effort, and financial resources, MBS students who pursued this degree acknowledged its elevated benefits:

“Learning to interpret complex and high-tech concepts into products and services that benefit my industry is a strength that I can continue developing.”

“With jobs becoming more and more specialized and requiring knowledge from all fields, there is a need for more degree programs that offer a multidisciplinary approach and can teach students knowledge and skills from different areas.”

“The program's purpose is to learn technical expertise while also developing the necessary skills to succeed in the business world.”

“MBS is a very contemporary degree that will help prepare a scientist for a leadership role and entrepreneurship.”

“I conclude that the experience not only made me a better scientist but also prepared me in unpredictable ways for my career. Through courses, lectures, and workshops, I was challenged to discover a voice I didn't know I had. By engaging with my colleagues, we're able to view a problem from many different angles instead of just one, and so we have a better chance of identifying possible alternatives and evaluating the best path forward.”

“I believe that the MBS degree makes me competitive in the job market and allows me to make a difference in any company with a diverse range of analytical tools at my disposal along with knowledge on business fundamentals.”

“The MBS degree allows its students to get the most up-to-date skill sets that are in the most demand in the current job market.”

“A master’s degree will allow you to contribute out of the school. The knowledge and skills gained will make you a leader that will eventually share that chain of knowledge.”

Benefits.

Research from CNBS, “The master’s degrees that give the highest salary boost—up to 87% more money,” shows that salaries are increased by achieving a master’s degree in comparison to a bachelor’s degree.

In 2021, the National Association of Colleges and Employers analyzed the average master’s degree starting salaries compared to the average bachelor’s degree starting salaries. The greatest differential showed that Biology master’s degree graduates make 87% more than bachelor’s degree graduates (master’s \$69.4K vs. bachelor’s \$37.1K). Other disciplines also showed the salary increase of a master’s degree: Business administration/management (51% increase: master’s \$82.3K vs. bachelor’s \$54.4K), Computer science (32% increase: master’s \$104.1K vs. bachelor’s \$78.6K), Management information systems (32%: master’s \$82.6K vs. bachelor’s \$62.4K) and Statistics (19% increase: master’s \$90.5K vs. bachelor’s \$75.9K).¹

There are other financial benefits associated with receiving an advanced degree.

The Pew Research Center found that advanced degree workers were less impacted by the pandemic effects, i.e., they were less likely to have lost health insurance and pay bills. Federal Reserve data indicated the unemployment rate was two times higher for high school graduates than those with a master’s degree.²

In addition, many master’s degree students rate this as a satisfying experience. Recent research published in Nature (November 2022), “‘Intellectual challenge’: Master’s students find reasons to be satisfied with their degree programs,” supports master’s degree students’ satisfaction with their decision to pursue a graduate degree.

Over two-thirds of master’s students (68%) who participated in Nature’s latest graduate-student survey say that they are satisfied with their current programs, a level of contentment that puts them ahead of PhD student colleagues (60%). And 79% say that they are also satisfied with their decision to pursue a graduate degree, compared with 74% for PhD students. Over half (54%) of the sample, “dramatically or substantially” agreed that they expected the master’s degree to improve their job prospects. 27% indicated that it would “somewhat” improve their job prospects. Almost two-thirds (65%) indicated the main reason for pursuing a master’s degree was “personal interest in my subject of choice.”³

With the application to a master’s degree program, you’ve chosen to play in the “big leagues.” The master’s makes a personal and public statement about the training and perseverance required to achieve it. But the work that you do also fuels and sustains the global economy through the innovation and advancement of products and services.

Understanding the value of a master’s degree for STEM innovators and entrepreneurs.

The National Academies of Sciences, Engineering, and Medicine conducted a comprehensive analysis of graduate education published in 2018 called “Graduate STEM Education for the 21st Century.” This consensus study report was led by editors Alan Leshner and Layne Scherer for the Committee on Revitalizing Graduate STEM Education for the 21st Century, Board on Higher Education and Workforce and Policy and Global Affairs.

This chapter draws heavily from the report’s analysis, findings, and recommendations.

STEM specialists play an important role in society.

STEM professionals contribute to society in a variety of ways. The National Academies consensus study report defines STEM as: includes mathematics, natural sciences, engineering, computer and information sciences, and the social and behavioral sciences—psychology, economics, sociology, and political science (NSF, 2018).

For more than 70 years, the American science, technology, engineering, and mathematics (STEM) enterprise has served the nation extremely well, yielding great benefits in virtually every sphere of life, including the economy, the environment, national security, and the health of the public. On the economic front, for example, nearly 8.6 million Americans were employed in STEM jobs in 2015, 93 percent of which paid better than the average national wage (Fayer et al., 2017). STEM workers are also more likely to apply for, receive, and commercialize patents (Thomasian, 2011). The STEM education enterprise has excelled at serving the nation by training generations of professionals with STEM graduate degrees who have the deep knowledge base, advanced critical thinking skills, and ability to be the independent thinkers who are most likely to produce the innovations and scientific advances that have given the United States a competitive edge in today’s global economy. P.15⁴

Graduate STEM education is a critical bridge to advancing STEM expertise.

The STEM educational enterprise has an important role to play in training these specialists.

Graduate education is basic to the achievement of national goals in two ways. First, our universities are responsible for producing the teachers and researchers of the future—the independent investigators who will lay the groundwork for the paradigms and products of tomorrow and who will educate later generations of researchers. Second, graduate education contributes directly to the broader national goals of technological, economic,

and cultural development. We increasingly depend on people with advanced scientific and technological knowledge in developing new technologies and industries, reducing environmental pollution, combating disease and hunger, developing new sources of energy, and maintaining the competitiveness of industry. Our graduate schools of science and engineering are therefore important not only as sources of future leaders in science and engineering, but also as an indispensable underpinning of national strength and prosperity—sustaining the creativity and intellectual vigor needed to address a growing range of social and economic concerns. P.17⁴

Perhaps the most important outcomes of graduate education, in addition to the research generated by the faculty and students, is the preparation of innovators and entrepreneurs capable of advancing the frontiers of discovery. For students, graduate STEM education provides experiential, relevant exposure to the process by which STEM professionals conduct research, make new discoveries, and foster innovation. P.17⁴

This system has consistently produced both master's and Ph.D. graduates who leave their graduate universities with a deep understanding of their disciplines' content areas and who have learned the practical skills and sophisticated analytical methods needed to conduct research, and it remains the largest destination for graduate education in the world (OECD, 2017). P. 29⁴

Many more STEM students are receiving master's degrees than ever before.

Throughout the development of university education, bachelor's degrees were generally the most sought-after level of education, with comparatively few seeking doctorate degrees for research or academic positions. Master's degrees were rarely entertained.

However, since 2000, the number of individuals seeking master's degrees has grown significantly. Numerous explanations have been provided. Bachelor's degrees are now so common that employers perceive them to be a minimum requirement. Employers want greater mastery, particularly in healthcare, where a master's is mandatory for the higher level of skills, knowledge, and training needed for the job. Job seekers with master's degrees experience greater earning potential as well as increased management and career advancement opportunities. And others seek master's degrees for the personal satisfaction of becoming an expert in a field or more competitive in the job market.

The number of students enrolled in graduate STEM education system has grown steadily, increasing from 303,000 in 1975 (NCSES, 2004) to nearly 668,000 students in 2015 (NSB, 2018c). According to the National Center for Science and Engineering Statistics (NCSES), as stated in Science and Engineering Indicators (SEI) 2018, Most of the growth in this period [in graduate STEM enrollment] occurred in the 2000s, with stable enrollment between 2008 and 2013 and resumed growth in 2014 and 2015. (NSB, 2018n1).

The number of degrees awarded over the 2000-2015 period has also grown substantially. In 2015, approximately 225,500 graduate STEM degrees were awarded, with 181,000 at the master's level (NSB, 2018d) and 44,500 at the doctoral level (NSB, 2018f).

Overall, the total number of degrees awarded in STEM fields increased at every level between 2000 and 2015. The number of master's degrees has shown the largest growth, increasing by nearly 88 percent over the 15-year period. In comparison, the number of doctoral STEM degrees increased by 60 percent (NSB, 2018b). Regarding proportion of STEM degrees awarded compared to non-STEM degrees, STEM master's degrees accounted for 24.7 percent of all master's degrees awarded in 2015 (NSB, 2018d), while at the doctoral level, STEM degrees accounted for 64.4 percent of all Ph.D.'s awarded in 2015 (NSB, 2018f). PP. 30-31⁴

Educational institutions are responding.

Higher education is responding to this increase in interest on the part of students and industry.

Master's degree programs in many science, technology, engineering, and mathematics (STEM) fields have a reputation of successfully meeting market and workforce demands, at least in part because of their flexible nature, and because the master's degree opens multiple educational and career pathways for students. As of 2015, there were 3.7 million people in the U.S. labor market whose most advanced degree was a master's in a STEM field (NSB, 2018c). For these reasons, an increasing number of U.S. universities are offering programs designed specifically for students seeking a master's degree. Although the incentives for creating master's programs can be varied and multifaceted, the adaptability of the master's degree is suggested by the high rate of development of new inter- or multidisciplinary programs involving multiple academic departments (CGS, 2005). While career prospects for holders of a master's degree vary by field, a master's program can help students develop research skills, expand on content knowledge, gain technical expertise in a program geared to industry, and for some students, provide an opportunity to explore the discipline in a deeper way either to become a more attractive candidate for a doctoral program or to test interest in a particular field. P. 91⁴

According to an analysis of Census Bureau data, more gainfully employed STEM professionals have master's degrees than Ph.D.'s, with the one exception being among life and physical scientists (AFL-CIO, 2016). In addition, the Bureau of Labor Statistics (BLS, 2013) projects that occupations requiring STEM master's degrees will be the fastest growing segment in many STEM fields, including those in mathematics and in computer, life, physical, and social sciences. PP. 91-92⁴

Segmenting of master's degree types.

As the demand for master's training grew, universities responded by offering different types of programs.

There are many types of master's programs (NRC, 2008), just as there are many reasons that students pursue the master's degree. Generally, STEM master's degree programs take one of three forms. The more traditional-style STEM master's degree program focuses on building subject matter expertise and includes a research project leading to a thesis or another type of capstone project. Within this type of degree program, there are professions such as engineering and psychology that recognize the master's as a terminal degree, while in others, such as biology and physics, students enroll less frequently with the intent of seeking only a master's degree. Some students may enroll in a Ph.D. program and, during the course of their studies, decide the Ph.D. degree does not fit their career plans, because they do not get the mentoring or other forms of support they need to succeed at that level, or because the master's degree allows them to secure well-paying jobs without having to complete a Ph.D. (CGS, 2010). P. 92⁴

Another type of STEM master's degree is the 2-year Professional Science master's (PSM). This degree program, developed in the late 1990s with input from industry leaders and funding from the Alfred P. Sloan Foundation, is designed specifically to fill the need for scientists who have been trained to work primarily outside of academia. The PSM degree combines rigorous, discipline-based coursework in science and mathematics with training in management, law, and other business areas. This degree is typically self-financed by the student.

Thanks in part to funding from the Alfred P. Sloan Foundation to establish the program in 1997 (the foundation's funding ended in 2010) as well as more recent funding from the National Science Foundation, there are now 355 PSM programs offered by 165 U.S. institutions. The Council of Graduate Schools (CGS) has developed a guide for schools intending to develop a PSM program, and there is a national PSM office, formerly run by CGS and now operated by the Keck Graduate Institute. According to 2014 data, the fields with the most PSM programs are environmental and climate sciences (47), biotechnology (41), other biological sciences (36), and computer and information sciences (28) (Komura, 2015). PP. 92-93⁴

When CGS asked recent graduates to identify the benefits from having earned a PSM degree, 80.8 percent said it was to acquire specific skills and knowledge, 46.6 percent said it was to increase opportunities for promotions, and 26.5 percent said it was to meet requirements of a current or prospective employer (Allum, 2013). Recent program graduates ranked their satisfaction highly, with 87 percent selecting "very satisfied" or "generally satisfied" for the quality of the scientific and/or mathematics training and the internships and "real world" practical experiences they gained through their programs. Other aspects of the program that recent graduates rated with high satisfaction included the distinctive nature of the program (83 percent); quality of the nonscientific professional training they acquired (82 percent); networking opportunities (78 percent); and post-graduation employment prospects (72 percent) (Allum, 2013). P. 93⁴

Key Findings: Defining a leadership model for innovative STEM master's degrees.

The National Academies comprehensive study provided the following shared characteristics of STEM master's degree programs:

- 1. Disciplinary and interdisciplinary knowledge: Master's students should develop core disciplinary knowledge and the ability to work between disciplines.*
- 2. Professional competencies: Master's students should develop abilities defined by a given profession (e.g., licensing, other credentials).*
- 3. Foundational and transferrable skills: Master's students should develop skills that transcend disciplines and are applicable in any context, such as communications, leadership, and working in teams. These dimensions are especially critical as the lines that traditionally define scientific and engineering disciplines become blurred—and more scientific research and application are characterized by the convergence of disciplines.*
- 4. Research: Master's students should develop the ability to apply the scientific method, understand the application of statistical analysis, gain experience in conducting research and other field studies, learn about and understand the importance of research responsibility and integrity, and engage in work-based learning and research in a systematic manner." P. 94⁴*

In the Rutgers MBS degree program, experiential learning is also considered research.

Creating Rutgers' Professional Science Master's Program.

The interest shown in the MBS degree program corresponding to an interest expressed in the growth of the master's degree overall in recent years has helped Rutgers' MBS degree program to clarify the role of a master's degree in relation to a bachelor's and doctorate degree.

Simplistically, in the past, a bachelor's degree was broadly associated with providing a basic level of knowledge in a chosen subject area. A doctoral degree was broadly associated with providing the highest level of knowledge for conducting research in a subject area. Therefore, a master's degree, being in the middle of these two degrees, provided students with an intermediate level of knowledge in a subject area.

The Rutgers MBS degree program is clarifying and dimensionalizing what a master's degree means, i.e., not just intermediate learning, but advanced training in STEM-related technical areas along with important transferable skills in business and a lifelong learning mindset for applicability throughout one's career.

In some ways, this shares the learning mindset of a doctoral student. The MBS degree program gives the master's degree a new reason for being—an advanced level of knowledge and “know-

how” relative to the bachelor’s basic level of knowledge but not theoretical and heavily research-oriented with the purpose of publishing associated with the doctoral level. So, the MBS degree is advanced learning, broadly and practically applied to the business marketplace.

As described by Dr. Deborah Silver in the paper, “Science Master’s Program (SMP): Fueling Innovation in New Jersey through Graduate Education,” the Rutgers Professional Science Master’s (PSM) program was designed to train students to become future leaders in industry and government and to educate working scientists, engineers, and technologists in multidisciplinary, cutting-edge science, technology, and business development areas.

“In this program, you will understand the linkages between science, engineering, technology, and business, and will learn how to lead innovations from ideas to commercialization. By collaborating with and drawing from undergraduate and graduate education feeder programs, the model for PSM programs not only improves the STEM-to-industry connection but also increases the number of underrepresented minority graduates by providing a new career pathway with role models to blaze the trail.”⁵

Rutgers’ PSM program covers a wide variety of technical areas, each with its own track, concentrations, and requirements defined by the lead School(s) as well as providing MBS students with valuable transferable skills and lifelong learning skills (i.e., learning how to learn) that will last a lifetime.

These areas are united under a common Rutgers brand and PSM framework and share some common defining elements that seek to be “best in class”:

1. Professionally guided curriculum.
2. Mix of science/engineering and business/management.
3. Closely tied to areas of research strength at Rutgers.
4. Learning occurring on real technologies.
5. Terminal degrees designed to prepare people for career paths in industry.
6. Work experience—required internships or cooperative education for those not already working in the sector.
7. Heavily instituting team-based learning.
8. Modular format that would allow for easy transfer of credits among schools and degree tracks and customization of interdisciplinary programs by students.
9. Certificates and joint degree programs that could be constructed using the same sets of courses.
10. Integrative courses and experiences that bridge science and business, including a capstone team project.
11. Novel innovations that are aligned with real-time business practices to enhance productivity, including early additions of executive coaching, unique externship and internship relationships with industry.
12. Networking and professional events (panels, information sessions, workshops, etc.).
13. An active and engaged alumni network (MBS Alumni-Student mentoring program).
14. Flexible for working students (all concentrations are available online).
15. Career development.

Summary.

The definition of “mastery” by Merriam-Webster is a comparative one, implying greater than others (authority, upper hand) with respect to a contest, competition, great skill, technique, or knowledge of a subject. Synonyms: dominion, superiority, ascendancy, command.⁶

1. a. the authority of a master : **DOMINION**

b. the upper hand in a contest or competition : **SUPERIORITY, ASCENDANCY**

2. a. possession or display of great skill or technique

b. skill or knowledge that makes one master of a subject: **COMMAND**

This chapter demonstrates the value of mastery by engaging in the PSM program to receive the MBS degree.

The MBS degree delivers “mastery” through its competitive standards of learning and achievement that can be evaluated by the delivery of objectives that lead not only to your own personal advancement but to the advancement of society.

The mastery you achieved in receiving this degree will serve you well as you continue to build on this expertise or expand your expertise after you leave the program. This behavior of being a “serial master” will only help to enhance your competencies in your job and contribute to your lifelong learning mindset.

The Plays

It's important to recognize the mastery you are achieving as you progress through the program as well as what you have accomplished after receiving your degree. Here are some plays to help you with that reflection.

Play 1: Mastery questions:

1. What does mastery mean to you?
2. What are the benefits of mastery to you in your job?
3. What are your expectations for achieving mastery?
4. How will you enhance your mastery? What role does learning play? Current and future?

Play 2: Why are you pursuing the MBS degree?

1. Provide your thoughts in writing. You will refer to these thoughts in later chapters.

Play 3: Mastery Coaching exercise:

1. Think of the biggest goals you've achieved in your life. Select one. What was it? Why that goal? What was happening in your life at that time that made this an important goal to achieve?

2. What was your process for achieving the goal? What were the steps?

3. What was the final result?

4. How can you apply that situation and the strategies/process and steps you used to achieve that goal to this one for pursuing an MBS degree?
 - a. Or for your next challenge?

5. What is the lifelong learning lesson for you in thinking about mastery?

CHAPTER 3: NOTES

Thanks to David Finegold, Rupa Misra, Alycia John, and Vicki Pasigos for their interviews and Kathleen Cashman-Walter and Caroline Thorpe, who provided quotes from MBS students, and Robert Warfsman.

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Chapter 4

“Professional” Science Skills

Where Science Meets Knowing How

“Those who are in love with practice without knowledge are like the sailor who goes into a ship without a rudder or compass and who never can be certain whither he is going.” Leonardo da Vinci

You have arrived on the doorstep of the Professional Science Master’s Program (PSM) to pursue the Master of Business and Science Degree (MBS). That means you have qualifications, interest, and experience in STEM-related fields, i.e., science, technology, engineering, and math.

This chapter describes the treasure trove of science tracks, concentrations, and courses offered by the MBS degree. It shows how these offerings are identified and constructed so that you are equipped to step into the working world as a contributor to the company hiring you. This chapter demonstrates how the MBS degree program turns science “knowledge into know-how” to help you realize your professional career aspirations.

Let’s start with the things that you would take into consideration to identify the science tracks, concentrations, and courses that would give you, as a working science professional, the foundation and the tools you would need to be an effective contributor to your company. What skills and competencies would you need to assume management and leadership roles in your organization?

Since the beginning of the program, Dr. Silver, co-creator of the program, along with the faculty and an industrial advisory board gave considerable thought to the workplace in which you would be entering or advancing and about your personal lives as well. This group knew that asking the right questions and gathering the right people would be critical to creating an appealing program with long-term growth potential and one that would become the largest and most diverse PSM program in the country. Here is the comprehensive, impressive list of strategic considerations they continuously wrestled with to provide the best MBS degree offerings.

1. What are the major job opportunities in the mid-Atlantic/New England area by industry, so that we can prepare our students for these opportunities in their backyard?
2. What companies have their headquarters in this region and, therefore, represent a source of job opportunities?
3. What are the technical skill expectations for the master’s degree level versus a bachelor’s degree level STEM graduate?
4. What “professional” or baseline technical skills are employers looking for and need?
5. How do we make the program a real-world experiential? How do we turn “knowledge into know-how”?

6. What trends are shaping the future, so that the tracks and concentration offerings are proactively, not retroactively, responding to marketplace employer needs in real-time or on a timely basis? (How do we adapt our framework to accommodate agile implementation of courses?)
7. How important is it to have industry-experienced faculty teach our students so they will be immediately useful in their positions when they receive their degrees?
8. How broad should the STEM offerings be to allow our students to pursue major industries but also discover new areas of interest or supplement their current pathway with an unrelated but exciting area?
9. In what other ways should we supplement the science curriculum to facilitate the development of our students so that they are ready to find jobs and be successful in those jobs? For example, by providing ways to apply their classroom learning through coaching, advising, mentoring, networking, teamwork, and providing internships and externships? How do we make the courses multidisciplinary not just interdisciplinary, like industry?
10. How do we design a program with our students at the center? How to make it personally relevant to the working professional?
11. Why is having a diverse student body and faculty important?
12. How do we make the program appealing to students from around the world?
13. How important is flexibility to allow our students to take the courses and finish the program on their own timetable? What are the implications of flexibility on faculty and staff resources?
14. How important will it be to constantly monitor what employers are looking for to make sure that our program is fulfilling their needs?
15. How to give our students a lifelong learning mindset so they are equipped for career development and satisfaction throughout their careers?

Developing the Professional Science Master's curriculum.

From these numerous questions and taking a page out of the “design” playbook (references in Chapters 1 and 9), it was clear that putting together a well-regarded and highly rewarding PSM curriculum would require:

1. Relevant science and engineering tracks, concentrations, and course offerings.
2. Great instructors with current industry experience.
3. Experiences for students to apply their learning.

What is required for the MBS degree?

The MBS degree requires forty-three total credits divided between twenty-four science credits and nineteen business credits. All students take:

1. Eight courses in a science concentration or electives in the applied science and engineering tracks.
2. Five core business courses and the Capstone in lieu of a Master of Science thesis.

3. Other MBS requirements: relevant work experience and twelve colloquia (lectures, events, networking).

Designing your curriculum.

No doubt, there is a very intriguing array of courses from which to choose across the tracks and concentrations. How do you go about making your course selections?

This student-centered program asks you to think about your job or career goals and using that as guidance create a personalized curriculum with a prescribed number of courses and electives that fit your desired job or career goals. Then with the help of advisors, faculty, administrators, and executive coaches, you will be asked to see if there are other courses that pique your interest. Courses that might have relevance for skill development in a particular area of interest or courses that might be useful or fun to take based on an interest or passion, now or even in the future. You are in effect, “designing your life with your curriculum.”

Track and concentration highlights.

Each concentration provides a wealth of knowledge, relevancy, and appeal and attempts to be unique in relation to its peer institutions.

SCIENCE TRACKS AND CONCENTRATION OFFERINGS

All of the science tracks correspond to science careers in industry. The science tracks are divided into three main categories – Life Sciences, Engineering Management, and Computer and Information Sciences. The Life Sciences track includes concentrations such as Drug Discovery, Biotechnology and Genomics, Personal Care (cosmetic) Science, Agriculture, Applied Food Science and Technology, and Sustainability. Below we discuss some of the more popular concentrations. The full listing is on our website: mbs.rutgers.edu.

LIFE SCIENCES

Drug Discovery and Development, Biotechnology and Genomics, and Personal Care are the largest concentrations given Rutgers’ proximity to the giants in these two areas: pharmaceutical companies and personal care (cosmetic) companies. These are unique areas not offered in most business schools or graduate schools. The courses include subjects that are crucial to these industries but are not usually taught, such as regulatory affairs, clinical trials, formulations,

The uniqueness of these two concentrations is the ability to bring in instructors who have or are working in companies related to these two areas. In addition, the externship and internship opportunities are more numerous, given their location to the companies in these two areas, where students can participate in relevant, problem-solving situations that they will experience when

hired. Not surprisingly, networking, meetings, mentoring, attending lectures taught by the employees of these companies, and being involved in their externship and internship opportunities make MBS students attractive and competitive candidates for hiring.

Drug Discovery & Development

Overview

The goal of the MBS Drug Discovery & Development concentrations is to train students in the areas of drug development, regulatory affairs, drug discovery, biotechnology, and/or management of clinical trials. In addition to learning about processes related to pharmaceutical development, students will acquire fundamental knowledge of industry-related business areas including finance and accounting, entrepreneurship, communication and leadership, intellectual property, ethics, marketing, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain comprehensive knowledge of pharmaceutical science as well as industry-related business fundamentals.
2. Gain an overview of the commercialization process.
3. Learn about the guiding principles and best practices for product commercialization.
4. Gain analytical and communication skills suitable for managerial and leadership positions in clinical research, clinical trials, contract research organizations, federal regulatory agencies (such as the U.S. Food & Drug Administration), and pharmaceutical marketing.

Where our Drug Discovery and Development Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Drug Discovery and Development.

Titles	Companies
Senior Global Trial Manager	Bayer
Preclinical and Nonclinical Study Manager	Celgene
Biomarker Operations Lead	Eli Lilly and Company
Human Subjects Protection Analyst	Bristol Myers Squibb

Titles	Companies
And more!	Merck & Co.

Personal Care Science

Overview

The goal of the MBS Personal Care Science concentration is to educate and equip students with the skills and tools necessary to succeed in the personal care (cosmetic) industry. Students not only learn the fundamental processes and applications of personal care chemistry and formulations—including raw materials, bioactives, emulsions, hair biology, skin biology, and function—with opportunities to take courses in fragrances, regulatory affairs, sustainability, and colloid chemistry, but will gain fundamental knowledge of key business areas including finance and accounting, marketing, communication and leadership, ethics, intellectual property, and entrepreneurship.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain comprehensive knowledge of personal care science as well as business fundamentals.
2. Learn state-of-the-art processes and applications of personal care chemistry.
3. Gain an overview of the commercialization process.
4. Learn about the guiding principles and best practices for product development and commercialization.

Where Our Personal Care Science Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Personal Care Science.

Titles	Companies
Innovation Scientist Color and Skincare	L'Oréal
Research Chemist, Skin Care	Johnson & Johnson
Product Developer, Global Oral Care R&D	Shiseido

Titles	Companies
Scent Design Associate/Manager	Colgate-Palmolive
And more!	Estee Lauder

Food & Agriculture

There are two concentrations concerned with the production of our food sources – Global Agriculture and Applied Food Science and Technology.

Applied Food Science and Technology

Overview

The goal of the food science concentration is to educate and equip students with the knowledge, skills, and tools necessary to successfully understand and manage ongoing technical developments and commercial applications in the global food industry. In addition to learning fundamental principles and applications of food science and technology, students will gain comprehensive knowledge of key business areas including finance and accounting, entrepreneurship, marketing, communication and leadership, management and planning, intellectual property, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain comprehensive knowledge of food science and technology, as well as food safety and management.
2. Gain broad-based knowledge of key business skills relevant to the global food industry.
3. Gain in-depth understanding of end-to-end commercialization and innovation processes, as well as the guiding principles and best practices for product commercialization.
4. Learn to successfully integrate their scientific background and business knowledge to create and convert new ideas into commercially viable applications.
5. Learn to leverage their integrated science and business knowledge for complex problem-solving.

The Workforce:

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Global Food Technology & Innovation:

Titles	Companies
Innovation and Quality Manager	Bakerly
Associate Principal Scientist	PepsiCo
Plant Variety Examiner	The J.M. Smucker Company
Senior Quality Analyst	Blue Buffalo Co
And more!	And more!

Global Agriculture

Overview

The goal of the MBS Global Agriculture concentration is to educate and equip students with the skills, tools, and knowledge necessary to emerge as leaders within the global green industry. In addition to gaining a deep understanding of foundational aspects of agriculture—including plant pathology, environmental sustainability, and crop management—students will gain comprehensive knowledge of key business areas including finance and accounting, entrepreneurship, marketing, communication and leadership, management and planning, intellectual property, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain a thorough understanding of the international agricultural industry.
2. Gain fundamental, working knowledge of agriculture industry production and management processes.
3. Gain broad-based knowledge about environmental conservation and the role agricultural enterprises play in maintaining a healthy global environment.
4. Gain a fundamental overview of key business areas that both impact and are impacted by the international agricultural industry.

Where our Global Agriculture Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Global Agriculture.

Titles	Companies
Director of Urban Farming	Greater Newark Conservancy
Training and Quality Assurance Coordinator	Denka Company Limited
Plant Variety Examiner	Waksman Institute of Technology
Product Development / High-Value Crops Specialist	USDA Animal and Plant Health Inspection Service (APHIS)
And more!	And more!

Sustainability

Overview

The goal of the MBS Sustainability concentration is to educate and equip students with the skills and tools necessary to identify, analyze, and better understand connections among social, environmental, technological, and economic systems—environmental, social, and governance (ESG)—as well as the forces driving these systems. In addition to learning state-of-the-art methods to successfully measure, predict, and influence key processes that influence sustainability, students gain fundamental business knowledge in areas including finance and accounting, marketing, communication and leadership, ethics, intellectual property, regulatory, and entrepreneurship.

Skills Gained

Through expert instruction and experiential education, students will:

1. Learn a systems-based problem-solving approach to envision and forecast how individual and local actions can affect the function of larger ecosystems, structures, organizations, and/or processes.
2. Gain fundamental understanding of the interactions of social, environmental, and economic systems.
3. Learn to propose and promote strategies that meet short-term organizational needs while promoting long-term, sustainable outcomes.
4. Gain fundamental knowledge of key business areas related to sustainability, as well as the impact of sustainability efforts on these areas.

Where our Sustainability Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Sustainability.

Titles	Companies
Commercial Energy Advisor	The Chemours Company
Environmental Specialist	TRC Companies, Inc.
Solar Consultant	Tesla, Inc.
Energy Efficiency Outreach Manager	Momentum Solar
Environmental Compliance Specialist	Samsung C&T
And more!	And more!

Biotechnology and Genomics*Overview*

The goal of the MBS Biotechnology & Genomics concentration is to educate and equip students with the skills and tools necessary for managing technical development and commercial applications in the areas of molecular biological sciences, including biotechnology, genomics and proteomics, biochemistry, cell biology, systems biology, and nanobiotechnology, for application in wide-ranging, diverse industries including healthcare, pharmaceutical development, personal care, agriculture, alternative energy, environmental monitoring and restoration, and nanotechnology. In addition to learning fundamental principles and applications of biotechnology and genomics, students will gain fundamental business knowledge in areas including finance and accounting, entrepreneurship, communication and leadership, management and planning, intellectual property, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will gain:

1. Comprehensive understanding of rapidly evolving developments in structural and analytical methods.
2. Knowledge of state-of-the-art research methods.

3. Knowledge of current best practices and protocols in this field.
4. Computational approaches needed to handle large datasets.

Where our Biotechnology and Genomics Alumni Work

Students can apply their knowledge in industries including healthcare, pharmaceutical development, personal care, agriculture, alternative energy, environmental monitoring and restoration, and nanotechnology.

Titles	Companies
Analytical Biochemist	AstraZeneca
Oncology Research Financial Analyst	Regeneron Pharmaceuticals, Inc.
Manager, Product Strategies	Novo Nordisk
Associate Director, Contract Strategy	Merck & Co.
And more!	And more!

COMPUTER AND INFORMATION SCIENCES

Analytics and Cybersecurity

Another example of what employers are clamoring for are the PSM concentrations of Data Sciences and Information Technology. There are many programs in the country offering relevant skill sets, but the PSM concentrations are looking for differentiators that will give their graduates an edge over other prospective employees.

The coordinators of this program, as described below, are researching to identify industry emerging trends, i.e., the new areas that can change rapidly from year to year. A prime example of that would be cybersecurity, where skills need to be constantly updated. The MBS instructors have direct access to what is currently happening in the rapidly evolving marketplace, so they can teach students what is current, not a generation behind as stated,

“The MBS uniqueness resides in being able to provide basic industry knowledge and analytical skills that employers are currently seeking. So we challenge ourselves to be on the cutting edge in the industry, so that we know what skills students need to be hired.”

The benefits of this program:

1. Recognize that students have different pathways. Each requires different skills and certifications.
2. Many students do not have IT expertise but come from other academic areas: criminal justice, psychology, and law, so bringing students up to speed in IT is needed to help them get the jobs they are seeking.
3. Industry experts are brought into the classroom to provide hands-on experience. In analytics, students are required to do an industry project where they learn core skills and apply them, demonstrating a “know-how” in business.
4. High standards are set through solving hard problems. Students must be able to communicate to experts and non-experts about their process and their results. This is a very rare skill but one we teach. One student came back and told us that her boss asked her to teach how to communicate what they had to say, since the other employees couldn’t convey it.

Analytics: Discovery Informatics and Data Sciences

Overview

The goal of the MBS Analytics: Discovery Informatics & Data Sciences concentration is to educate and equip students with the knowledge, skills, and tools necessary to fully understand and successfully direct data-driven decision-making.

Within this concentration, students can choose from one of eight dedicated pathways and can also choose electives from a wide range of disciplines. Pathways include:

1. Health Informatics
2. Finance Analytics
3. Technical Analytics
4. Business Intelligence & Analytics
5. AI & Analytics
6. Data Science & Security Intelligence
7. Analytics & Supply Chain
8. Analytics: Design Thinking & Analytics

Reference the curriculum page to see how these pathways differ. The pathways were created using an analysis of the labor market for positions in analytics.

Through integrated coursework, students will gain a broad knowledge of fields including computer science, statistics, machine learning, data mining, and big data while also learning key aspects of business areas, including communication, leadership, marketing, management and planning, intellectual property, entrepreneurship, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will gain:

1. The ability to analyze large datasets.
2. Thorough understanding of how data analysis drives business decision-making.
3. Mastery in developing modeling solutions to support decision-making.
4. Integrated knowledge of advanced analytics and key business areas.

Where our Analytics Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Analytics:

Titles	Companies
Big Data Lead	Legg Mason
Solutions Consultant	Deloitte Consulting
Business Intelligence Architect	JPMorgan Chase & Co.
Data Analytics Specialist	Credit Suisse
And more!	And more!

Cybersecurity

Overview

The MBS Cybersecurity concentration is designed to prepare students for industry roles based on students' experience and backgrounds in wide-ranging disciplines, both technical and non-technical.

Within this concentration, students can choose from one of five dedicated pathways and can also choose electives from a wide range of disciplines. Pathways include:

1. Technical Cybersecurity
2. Digital Forensics
3. Cybersecurity Management
4. Computer Forensics & Big Data
5. Cybersecurity Management & Policy
6. Cyber Secure Supply Chains
7. Cybersecurity & Corporate ESG (Environmental, Social, Governance)

Reference the curriculum page to see how these pathways differ.

Students will not only learn fundamental aspects of cybersecurity, but will gain a deep understanding of key business areas including finance and accounting, entrepreneurship, marketing, communication and leadership, management and planning, intellectual property, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain mission-critical skills to secure information technology infrastructure.
2. Gain business skills necessary to become strategic experts and leaders.
3. Learn best industry practices and protocols.
4. Gain integrated, well-rounded knowledge of technology in relation to policing, business, policy, and legal issues.

Where our Cybersecurity Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Cybersecurity:

Titles	Companies
Information System Security Officer	Lockheed Martin
DevOps Engineer	Rutgers University Police Department
Cyber Security Engineer	RWJ Barnabas Health
Cyber Security Analyst	Vydia
And more!	And more!

User Experience Design

Overview

The goal of the MBS User Experience Design (UXD) concentration is to educate and equip students with the knowledge and skills necessary to succeed in this rapidly evolving field—with

advanced training in the tools and techniques necessary to design and develop engaging, user-friendly, and accessible interfaces for websites, mobile apps, and more. Students will also learn key aspects of business areas including communication, leadership, marketing, management and planning, intellectual property, entrepreneurship, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Learn state-of-the-art methods and best practices for gathering user information.
2. Develop a fundamental understanding of design methods and principles (drawing from human-computer interaction and interaction design).
3. Learn about the psychology, communication, and sociological theories that guide design.
4. Learn to drive and implement designs via visual design and programming.
5. Learn to perform effective prototyping and evaluate a wide spectrum of interactive media.

Where our UXD Alumni Work

As UXD becomes increasingly central to business success, MBS graduates enjoy wide-ranging positions in this rapidly evolving field.

Titles	Companies
UX/Visual Designer	BuzzFeed
UX Designer/Information Architect	Solstice
Senior UX Researcher	Verizon
UX Designer, CIO Design	The Home Depot
And more!	And more!

The introduction of new courses and concentrations.

How do we advance our professional science skills? We conduct research that includes labor analysis of jobs and skills using various databases (like Lightcast.io), and we speak with industry experts to provide professional input. The MBS degree programs look five years ahead so we are

preparing you for what you will need. This analysis is done on a continuous basis in addition to following a formal academic curriculum review.

Examples of this kind of analysis provide input for curricular offerings and are also shared with students to notify them of opportunities.

In 2019, MBS ran an article, “Cybersecurity-Jobs in Great Demand,” that sounded the alarm about a shortage of professionals in cybersecurity. See this article that shows the size of the opportunities, the specific job titles, industries, hard and soft skills, and geographic location of the opportunities needed at that time.¹

Another example of a labor market analysis in 2020 showed the effect of COVID-19 on jobs. The article “Analyzing the Data: Interpreting National Economic Impact in Relation to our Regional Economy” provided data on its effect on specific occupations, companies, and skills needed.²

A third example, “Top Tech Skills Needed in the Workforce (and how MBS Can Help!),” showed the kind of research the program uses to help students find lists of top skills in demand and tell students which classes we have that teach those skills.³

The faculty ensures that the course content keeps pace with industry advancements for today and tomorrow, through researching trends and workforce demands. As the examples demonstrate, the concentrations are also regularly evaluated and new concentrations or courses are added to ensure that MBS students are on the leading edge of industry developments. One example of the relevancy and agility of the program is a new program that was introduced to the PSM roster in the Fall of 2022, representing an emerging area of expertise: Product Design. This concentration teaches students the overall design, manufacturing, and marketing process for technology-based products from a human-centered perspective. This is the first degree in product design offered at Rutgers University.

Product Design, a new addition.

The students who signed up for the inaugural course shared their perceived value and expectations.

“I wanted to choose an elective that would be as relevant as possible to what I want to work in or a skill I can build. Product design is obviously becoming a very up-and-coming field, so to learn more about it as well as the processes behind it will definitely be useful for future interviews.”

“Within my current role at my company, I had the opportunity to pivot my career from research and development to supply chain thanks to the MBS. All of those (core business) classes allowed me to build foundations to talk to other people about my business side in the food industry. In my new role, I need to understand the larger picture of product development and design. This course will help me communicate with others about the end-to-end process.”

“I enrolled in the course due to my desire to develop a more holistic approach to UX and UI design. This holistic approach includes blending business goals and long-term strategy with user needs to develop a product. I figured that this course would be able to provide that based on my readings, and it certainly did.”

Overview

The MBS Product Design concentration is centered around an interdisciplinary curriculum structured to educate and equip students with the skills and tools necessary to manage, from a human-centered perspective, the overall design, manufacturing, and marketing process for technology-based products. Students will gain wide-ranging, specialized knowledge of all aspects of product design and development—including product management, analysis, and specification as well as user experience, artificial intelligence (AI), and supply chain. Concurrently, students will learn key aspects of business including communication, leadership, marketing, intellectual property, entrepreneurship, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Learn state-of-the-art methods and best practices for taking a product from concept to market.
2. Gain a fundamental understanding of all aspects related to successful product development (product quality, product cost, development time, etc.).
3. Learn to identify product opportunities and customer needs.
4. Learn about the psychology, communication, and sociological theories that guide product design in both form and function.
5. Learn about emerging technologies, including AI, blockchain, etc.
6. Develop and test a prototype using the design-thinking methodology.
7. Gain a deep understanding of interdisciplinary team dynamics and learn to foster proficiency in teamwork part-time.

Where our Product Design Alumni Work

Our alumni enjoy positions in a wide range of industries:

Titles	Companies
Product Designer	BuzzFeed
Commercial Product Manager	Johnson & Johnson
Clinical Product Manager	PepsiCo

Titles	Companies
Product Developer	Siemens Healthineers
Product Engineer	Tarte Cosmetics
And more!	And more!

Students shared their enthusiasm for this new offering.

“The speakers they had each week provided phenomenal insight into how the curriculum plays out in a variety of companies. It helps keep material current and gives you access to industry experts and leaders. Having the opportunity to ask questions of folks who may be your boss one day is a gift.”

“Part of why I enrolled [in PSM] was to meet people of different calibers and expertise and see what they’re actually doing with what we’re learning.”

“We heard from a panel on “The Social Responsibility of UX and Product Designers” where industry professionals tackled ethical questions such as whether designers should consider the environmental impacts of a product.”

“Whether you are going directly into product design or not, it’s useful knowledge to have, especially as it’s becoming such a big thing in the workforce and in collaboration with user experience design.”

“This class is highly relevant to the professional world. The course focused on teaching you how to justify the overall product, design choices, and feature selection given real-world constraints such as budgets and growth potential.”

“Make sure that you work in a product that is relevant to your career. And use this class to add value to their individual learning curves.”

“Out of all the courses I have taken within the MBS, this has been the most practical and applicable to developing physical and digital products. Another piece of advice: From the perspective of your day-to-day activities, start to look for opportunities where something can be optimized, reworked, or invented. There are opportunities all around you, and if you find something that you think might be an interesting idea, keep that in the back of your head and bring it to this class because you might be able to develop it into something really wonderful, and even something that you didn’t picture ahead of time.”

Information Technology

Overview

The goal of the MBS Information Technology concentration is to educate and equip students with the knowledge, skills, and tools necessary to successfully manage technical development and commercial application of information technology in a wide range of fields. In addition to gaining state-of-the-art technical knowledge, students will gain a fundamental understanding of key business areas including communication, leadership, marketing, management and planning, intellectual property, entrepreneurship, ethics, and regulatory.

Skills Gained

Through expert instruction and experiential education, students will:

1. Learn the principles and application of information technology and computer science.
2. Hone skills, including project management, teamwork, and communication.
3. Learn the fundamentals of making proper financial and technical decisions.

Where our Information Technology Alumni Work

Our alumni enjoy positions in a wide range of industries:

Titles	Companies
Senior Enterprise Architect	Lockheed Martin Corporation
Software Engineer - Intelligent Automation	Lenovo
Senior Web Developer	Amazon Web Services
Application Developer	Applied Dynamics International
And more!	And more!

ENGINEERING MANAGEMENT

Overview

The goal of the MBS Engineering Management concentration is to educate and equip students with the skills, tools, and knowledge necessary to successfully manage cross-disciplinary teams

responsible for developing new products and technologies; taking innovations from concept to market; implementing product improvements; and establishing or improving organizational infrastructure in rapidly evolving and increasingly globalized industries.

Within this concentration, students can choose to specialize in a dedicated pathway and can also choose technical electives from a wide range of engineering and technical disciplines. Pathways include:

1. Quality and Reliability Engineering
2. Product and Packaging Engineering
3. Pharmaceutical Engineering
4. Informatics and Data Engineering
5. Interdisciplinary Studies

(Reference the curriculum page to see how these pathways differ.)

Students will also gain comprehensive knowledge of key business areas including finance and accounting, entrepreneurship, marketing, communication and leadership, management and planning, intellectual property, ethics, and regulation.

Skills Gained

Through expert instruction and experiential education, students will:

1. Gain comprehensive knowledge of tools and skills essential to successful engineering and science management.
2. Develop a fundamental understanding of essential aspects of business, entrepreneurship, and commercialization.
3. Acquire and hone the skills and knowledge necessary to work in, navigate, and manage teams within rapidly evolving and increasingly globalized industries.

Where our Engineering Management Alumni Work

There are numerous job opportunities and career paths available to individuals with advanced knowledge of Engineering Management.

Titles	Companies
Product Engineer	Siemens
Senior Quality Engineer, Quality Management	IBM
Senior Process Excellence Engineer	Salesforce

Titles	Companies
Fixed Equipment & Reliability Engineer	Honeywell
And more!	And more!

This curriculum is well received as described by this student:

“This program is perfect for any engineer whose mind is structured to analyze things from technical perspective and wants to learn the skill to analyze from a business perspective. The program is well designed, well structured, well managed and well executed with knowledgeable professors and industry experts to help you excel in your career, open more opportunities and build lifelong connections.” T.P., MBS ‘20, Engineering Management

Experiential learning in the classroom.

Experiential learning through real-world experiences and working with others is an important element in the classes, as reflected by these student comments:

“The Rutgers MBS program brings together students from various concentrations into classes where the students have to work on independent as well as group projects. The group projects enable inputs from students belonging to diverse science backgrounds and broaden the intellectual reach and knowledge pertaining to projects. These diverse inputs come together and strengthen the team building, communication and interpersonal skills which are imperative in today’s competitive work environment.”

“As a graduate from the PSM program, I have learned tremendously from the coursework and lectures from professionals in the industry as well as from the network of professionals within the PSM program. Since I was able to work at a pharmaceutical company while attending this program, I have personally experienced and tangibly seen how this program has positioned me to succeed in my career. From being able to apply what I learned in the classroom to functions at my job as well as leveraging my work experience to contextualize the material that was taught in class, I can attest that this program offers a great deal of opportunities that has prepared me to succeed in my career.”

The Industrial Advisory Board.

The MBS Industrial Advisory Board (IAB) is a valuable resource for the PSM program. It is comprised of STEM-based business leaders representing a rich spectrum of industries—including pharmaceutical manufacturing, research and development, product development, media and television, consumer goods, and the energy sector—these members pool their vast

knowledge and expertise to help shape curriculum and keep programming and related initiatives cutting-edge, relevant, and impactful, keeping our program ever-current, and enabling the preparation of MBS students to meet the ever-changing demands of the 21st-century workforce.

The IAB members engage with students at events, including guest lectures, panel presentations, and mixers, where they discuss industry-specific trends, developments, and innovations as well as challenges facing business leaders today. Additionally, the alumni board members serve as a strong network for both current students and the growing number of alumni. Their passion for the MBS program and overall mentorship for success gives the MBS program a leading edge.

Putting it all together.

When all the questions and considerations are brought to bear on creating the science curriculum and experience, students see the value of increasing their science knowledge and know-how as reflected in their assessment of the program:

“I conclude that the experience not only made me a better scientist but also prepared me in unpredictable ways for my career. Through courses, lectures, and workshops, I was challenged to discover a voice I didn’t know I had. That voice has played a central role in my work, as knowledge of the pharmaceutical industry is vital for thinking, planning, communicating, and engaging with my colleagues we’re able to view a problem from many different angles instead of just one, we have a better chance of identifying possible alternatives and evaluating the best path forward.”

“One of the prime benefits of this program is that it helps build the skill set to grow and place scientific business professionals at the epicenter of essential decision-making within their organizations. This arguably makes them immediate assets to companies within their industry because they leave the program with the ability to translate scientific concepts to effective industry products. Furthermore, the program is not confined to just expanding upon a certain skill set. It also connects its students to experts in their respective fields through industry guest lecturers, professors, and their peers. This allows for a greater chance for students to learn more about the diverse array of opportunities within their fields.”

“A hybrid degree such as the MBS gives an engineer, designer, researcher, or any technical role the broader business knowledge to make strategic business decisions and to understand the full impact of those decisions. Cross-function effectiveness is critical to success. Leaders need to work effectively with people who think differently than they do. They also must be able to make strategic decisions, lead a high-performance team, communicate properly, negotiate, and persuade others on top of having a technical background.”

“My passion for science and haircare, combined with an increased interest in business education, is the reason why I selected to participate in this program. Learning to interpret complex and high-tech concepts into products and services that benefit the beauty industry is a strength that I continue developing.”

C.H., MBS '21

C.H. is an example of one student who brought together all of what the MBS program has to offer, starting with the Life Sciences concentration and created her own unique pathway to career success. While she was perusing Rutgers master's degree programs, she discovered the MBS degree. She graduated in January 2021. She currently works for Colgate-Palmolive in personal care implementation and support. During her time at MBS, she took part in an internship and externship for Colgate-Palmolive. After graduation, she entered their rotational research and development program before landing her current role. Here is her story...

*"I saw the cosmetic chemistry concentration and I was like, oh, this is it. This is exactly what I've been looking for. **It was like a beautiful cocktail of being excited to finally find your tribe of people who get what you love.***

*I always rep my graduate program at my job because it taught me so much and everyone at my job always asks me, 'How did you know this and this?' And I'm like, 'It's with my degree. It's the program.' **For whatever you want to go into, it really does lay a great primer for when you jump into your career, so I'm really grateful for it.***

I have that business acumen that I get to take advantage of and leverage here. I love any excuse to be creative. I love presenting. I love coming up with a story, whether it's for myself—because that's how I learn science. I find the story behind it, and I enjoy articulating it to people in a narrative-driven way. There's a lot of opportunity in my role right now, too.

I'm learning so much more about the science than I ever did before, but I also get to play around. They trust that I understand what I'm doing and that I'm making good decisions.

*You always leave feeling uplifted and really hammered home how this is an area to not only develop your professional acumen but also to just be a learner. Make sure you're always learning more about yourself and others **They really make sure to reiterate the importance of always developing that understanding, no matter where you're going and where your professional journey takes you.**"⁴*

In the Summer of 2019, C.H. participated in the MBS externship program. On one of five teams, she performed a market analysis for Church & Dwight. She later expressed interest in participating in another externship program for a personal care company. She was asked to serve as lead on an externship for Colgate-Palmolive. However, once learning more about the externship, Harris doubted that she had the background in data and analytics to serve as lead.

*"I was like, oh no. There's no way I can lead. Everyone on my team is data analytics concentration. I'm personal care science with a library background. I remember saying thank you for the opportunity. I really appreciate this beautiful honor of being lead, but I decline. And the Director messaged me back, 'I rescind your declination.' **I said, OK,***

let's give it a shot, and it ended up being one of the best things that ever happened to me."

That year, her team won best presentation poster and she won best lead extern.

"It was very, very, challenging, but in a very, very, fulfilling way."

During the externship, C.H. enjoyed working for Colgate-Palmolive and developing relationships with her mentors. Harris found a professional family at Colgate-Palmolive.

"I thought I would never feel that professional family anywhere else outside of my library and I got that at Colgate. That's when I really knew, oh, this is the company for me."

For all the classes that I took, all the webinars and all the workshops and panels that I attended, during those opportunities, the through line was exposure. It pushes you in a very healthy way to learn what you're made of, and to get a little grit. If there's someone whose professional journey really tracks with what you want and you desire to keep that alive, and especially if we have a great rapport with them, reach out to them."

[At MBS,] they really want you to advocate for yourself. And that's something that—especially for women in science—is so important for us. Gaining this business acumen grew her confidence as a scientist and businessperson."

When C.H. learned that the externship program was seeking more research and development externships, she volunteered.

"It's been so cool to serve in that role for students, especially knowing that just a second ago, I was on the other side of that. As a leader, I do my best to really evolve and help the students like I wanted to be helped, but also give them space to feel like they have agency and that they're empowered to do and think out-of-the-box in ways that they'd like to."

C.H. values the sense of community that she found through the personal care science concentration. The path toward this industry is not always straightforward, but she had help navigating the rocky terrain toward her goal. She calls personal care scientists "the chocolate chips within the cookie of this program.

"The MBS, it's fun, it's fulfilling, and it's something that will help you stand out within your career."⁴

Summary.

The science tracks and concentrations provide a dazzling array of courses that are current and important areas for study. The "professional" curriculum for each concentration shows the delivery of knowledge at a master's degree level that results in your enhanced capabilities and

confidence to be a contributor to your job. Students appreciate the experiential learning component that provides opportunities for you to practice and meet others in a real-world setting.

The breadth of science course offerings also provides you with opportunities to explore areas that might supplement your career interests or even create new personal interests and new career pathways. Who knows what experimenting with some new courses might reveal? It may set you on a new course of action!

The Plays

Think about and create your own personalized STEM curriculum, starting with the MBS tracks and concentrations.

Carefully consider these questions for each of your Odyssey Plans: 1, 2, 3 that you completed in Chapter 2 Plays.

1. What skills will you need to address your overall goals represented by the question, “*Why are you pursuing the MBS degree?*”
2. What technical skills will you need for each of your Odyssey Plans 1, 2, 3?
3. What courses will you need to complete your degree for each of your Odyssey Plans 1, 2, 3?
4. What courses/concentrations could you *add* to your current STEM area of expertise?
5. What different courses/concentrations might *expand* your current STEM area of expertise?
6. What courses/tracks might you explore out of *interest or passion or enhance what you are good at, unrelated to your current area of pursuit*? What courses pique your interests? (Consider your Odyssey 3 option)
7. Where do you envision yourself to be in 5 years? In 10 years? How might this envisioning affect the STEM track and concentrations you are considering?

CHAPTER 4: NOTES

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Chapter 5

Foundational Business Skills

Where Business Meets Knowing How

“American businesses need workers who are not only knowledgeable in their technical fields but also have the skills that can adapt that knowledge to compete profitably in the marketplace. Graduates with an MBS degree will know how to lead innovations from idea to commercialization, understand market and customer needs, know how to assess financial decisions, and demonstrate leadership and team-building skills.” Dr. Deborah Silver, Executive Director

It might seem as though science and business have very little in common, i.e., they play in very different leagues. On the surface of it, scientists work with inanimate objects, business with people. One group works in a lab, the other in an office. However, wanting to “move out of the research lab,” is a simplistic description of what motivates some STEM students to look at the MBS degree. So, why might some scientists need to know business?

The value of transferable skills.

Employers have identified different abilities (in addition to career-specific STEM technical expertise) they value in employees and that contribute to overall success in the workplace.

There are many different definitions for, and listings of, transferable skills and competencies. In general, transferable skills are learned capabilities that are often included in or outcomes of formal education and training. Competencies are behaviors stemming largely from experience-based know-how, as well as personal attitudes.

Transferable business skills include communication skills, problem-solving, business acumen, budgeting, finance, data organization and analysis, technological and digital literacy, and responsible/ethical conduct of research. Competencies include critical/strategic thinking, teamwork/collaboration, time management (plan, organize, prioritize work), punctual/organized/reliable, adaptable/flexible, leadership/project management, innovative/creative/entrepreneurial. These are the skills found in all job postings (see lightcast.io) and are even skills that get listed by AI sites when asked about all the skills that college degree holders should have.

The benefits of science and business language and fluency.

As Dr. Silver’s quote above explains, not surprisingly, there are so many smart, exciting, and meaningful reasons why MBS students say it’s important for scientists to become competent in business language and practices.

In speaking with our students and graduates, personal and professional growth were obvious motivators for why you sought something different than a traditional master’s degree. You shared a diverse set of important reasons for why you engaged in the MBS experience. We are going to share those here so that others might learn and be inspired by them in the way they may have inspired you.

1. Becoming better at my job
2. Becoming a better leader in my job
3. Getting a better job
4. Discovering more about myself
5. Becoming a better version of myself

Becoming better at my job.

Students mentioned learning a variety of new skills that allowed them to “become better in my job.” Many reasons had to do with being more well-rounded, i.e., gaining more skills or becoming more experienced across different functions that allowed them to be more effective or extend their influence in their positions.

Not surprisingly, being a good communicator is key in the business world or in any world. Being able to learn business concepts and language in the MBS program provides the students with a fluency they wouldn’t have had with their colleagues before the program. “Being able to speak the same language” as their colleagues leads to more direct engagement, influence, and meaningful forward progress by the organization.

Finally, a worthy goal mentioned by many is to be a contributor to the decision-making and success of an organization. The MBS degree program provides you with the ability to make a difference where it counts.

Below are the student’s comments reflecting how and why they imagine becoming better in their jobs with this degree.

Becoming a more well-rounded professional, so a better contributor to the organization.

“I want to be a well-rounded science professional. Through my work experience, I’ve learned how important it is to understand the business aspects of any role in a company. Understanding my contribution to the business gives value to my work.”

“I could confidently say that I am multifaceted or well-rounded and able to wear different hats knowing that I have a background in both science and chemistry but also in digital marketing.”

Working better with different departments due to a broader skill set.

“I have often heard management complain about key technical staff, for example our IT group, that ‘they don't know the business’ or ‘They aren't able to effectively communicate their hard skills and translate them into actionable items for business leaders.’ I am well equipped to bridge this gap.”

“With the knowledge background I got from the MBS program, I could easily understand what other people in my task group are working on, their concerns, and how I could support them with my work. Taking the program has drastically improved my work efficiency and influence in the organization.”

“Being equipped with the tools we had from the program also enabled me to grow not only as a scientist but also as a business leader with a scientist's view.”

“The business insights gained from completing this degree really helped facilitate and remain in conversations with the marketing team while still acting as an effective chemist in the lab.”

Becoming a better communicator and, therefore, a bridge across departments and functions.

“I found myself participating in many discussions at work where the solution was in front of everyone but because of the language barrier between different teams it took weeks to finalize the deal and move on! I am slowly getting the confidence to speak up and talk in front of many groups to help them understand each other better. I believe, thanks to the program, I will be the bridge and connector between them.”

“There can sometimes be a disconnect in communicating between people that work on the business side and the technical side of a project. However, MBS students stand out as they thrive in the in-between space.”

“Finding the patterns across separate fields simplifies things. This is a lot like the MBS degree. A great scientist may have amazing ideas but not be able to communicate them or they might not even be feasible in a business sense, rendering the idea useless. A businessperson may not understand the impacts of the decisions they're making. Understanding both these points of view is a uniquely valuable skill set.”

Making a difference in the company's decision-making and success.

“I have the expertise to work on many parts of a project from doing scientific research to calculating financial predictions. I know that I am a very valuable asset that can help improve any team that I work with.”

“The program provides you with the necessary skills in the business and entrepreneurial domain to translate the scientific know-how and convert it to a business opportunity.”

“Being able to know the science in our chosen concentrations while also understanding the business side can place us in a higher position where we are able to see the bigger picture and strategize in a way that leads to business success.”

“The MBS program is unique and is a master’s degree that prepares students with the necessary business acumen, entrepreneurial skills, and knowledge on how to translate scientific and technological ideas into profitable products and services.”

Becoming a better leader in my job.

Not all new employees start out as “leaders”; however, many may aspire to this position as the head of a team, unit, department, company, or global organization. The MBS program provides the tools to develop leadership skills that will benefit you throughout your career—as you start, advance, or achieve leadership status. Below are comments that students shared about how the program helped them become leaders.

Becoming a Leader.

“The program is an all-encompassing view of business and science, allowing us to speak both languages. Understanding how these seemingly different worlds come together will make us more well-rounded individuals and impactful leaders.”

“The MBS program truly is about building leaders in their scientific field while having the capacity and knowledge to engage in business decisions. Having these skills will surely advance anyone’s career.”

“MBS is a very contemporary degree that will help prepare a scientist for leadership role and entrepreneurship. It helps scientist understand the market side of the products and makes them a better team player. Good leaders are both specialists in a given field, but also need to become a generalist and be able to think in systems and holistically.”

Getting a better job.

Many students entering the program are looking to get a better job, either in the same company, the same industry, or an entirely different industry. The student-centered MBS program provides the curriculum in combination with real-world experience, and support from coaches, advisors, mentors, faculty, staff, and alumni to help you achieve that objective.

An important part of the MBS degree program is to provide not only the curriculum to help you achieve career goals in the near term, but a set of tools and a team of support to help you achieve career success throughout your lifelong career path. Later chapters talk about the lifelong learning mindset, a “learning how to learn,” that is a sustainable tool for achieving career success throughout your life.

All the people you will meet during your MBS experience and the skills you embrace will contribute to employers seeing your value to the company. This perceived value contributes to increased compensation and responsibility. Students shared many thoughts about why they were able to get better jobs based on their MBS degree experience.

Benefitting from better career opportunities and advancement.

“We know how to transform innovation into a successful business. I believe that the MBS degree makes me competitive in the job market and allows me to make a difference in any company with a diverse range of analytical tools at my disposal along with knowledge on business fundamentals.”

“The program's purpose is to learn the expertise of the science while also developing the necessary skills to succeed in the business world. This allows students to combine their passion for science with enthusiasm for the business. This gives greater flexibility in field choice and jobs available. The professional advantage in the industry shines through as not only to be an expert in the science but also familiar with the business practices. This provides the impression of being very capable, well-rounded.”

“Knowing how to direct projects, make decisions, distill requirements into actionable tasks, and especially how to mentor younger talent and manage teams, are all things I find very important to myself and my career advancements.”

“I never realized the importance a business background has in the scientific industry so I'm glad I'm pursuing this degree to open me up to all the versatile jobs I didn't know I could obtain.”

Finding new pathways and achieving career success.

“The MBS program really helped me leverage my skills as a project manager into IT/cybersecurity. I was able to learn about the industry, network effectively and landed my current position through the program. The Finance & Accounting course was particularly helpful in understanding the business side of the industry. The concepts that I learned here were directly applicable at my current job and to my own business.”

“Being a graduate of the Rutgers University MBS program has dramatically helped develop my career. As a biotech undergraduate I did not want to get pigeon-holed into bench work for my entire career. The perfect blend of an MS and MBA helped me to get my foot into the business side of science, landing a job as Manager of Quality. My experience in courses such as Ethics in Science and Communication and Leadership helped me to take advantage of leadership roles in groups and develop a thorough understanding of how the corporate side of science functions on a day-to-day basis, preparing me for my career.”

“My journey throughout the Business and Science program has been immensely insightful and empowering. It has given me an opportunity for multifaceted growth, where the Science courses helped me refine and augment my technical skills, the Business courses helped me capitalize on my Business acumen which in the current day scenario plays a very crucial role in professional success. All along the journey, I got to meet and

work with immensely knowledgeable professors, great researchers and also learn and work hand-in-hand with industry experts. In addition to the coursework, the distinguished colloquium series was a great experience, where students get a chance to be part of invaluable industry veteran talks, knowledge transfer sessions and workshops. Nevertheless, I'm thankful for the skills and confidence that the MBS program gave me, and I'm happy to say this without a question in my mind that the program has been instrumental in guiding me through the quest to carve a definite innovative path to my career."

Being more valuable to the company and being paid more.

"Share your scientific story in a business manner" which I think is an important skill that everyone should have. A lot of people out there usually can only talk about the business side or the technical/scientific side of work, not both. But those who can bridge the two sides together are more successful and are paid more because they can understand the problems experienced and the goals to achieve."

Discovering more about myself.

Improving your professional and personal skills starts with you learning more about yourself. Once you know yourself, you interact better with colleagues and teams. There is a ripple effect outward from you. The MBS program uses executive coaches in courses and in advising to help you learn more about yourself and how that understanding will help you be a more effective contributor to your organization. This contributes to a variety of perhaps newly gained leadership skills: flexibility, enhanced science contributions, and more clarity about your career directions. Students had much to say about the important role of understanding their own strengths and new areas for exploration.

Increasing flexibility in job positions and gaining benefits from being multi-faceted.

"I am multifaceted or well-rounded and able to wear different hats. MBS gives us exposure and shapes our outlook on planning, running a project, and implementing technology with business and technology in mind."

"I apply what I learn from class at work and then ask questions from work in my classes. I used to think one had to choose whether to be a businessperson or a science person, but the MBS program has proved me wrong. I used to think I only had the ability to think scientifically therefore I would not be able to understand the business side of things, but the MBS has shown me that I can do both. We as humans are not one-sided individuals, we can be both and MBS makes you stand out by being a multifaceted candidate."

Helping to define a career direction.

"Now my questions are, 'How can I apply my past technical experiences to the business sector?' and 'How can I bridge the gap between theory and practice?'"

“My passion has always been with food science and the MBS allows me to pursue higher education in business while still focusing on the scientific areas I am passionate about.”

Becoming a better version of myself.

Knowing yourself better helps you become a better version of yourself because you learn more about your interests, what motivates you, and how you interact with others. An important part of interacting with others is the recognition of diversity. This breadth of self-knowledge forms the basis for a growth mindset that leads to forward progress in your career. Becoming a lifelong learner is an important facilitator of that growth mindset and one that the MBS program promotes to prepare you for both the near term and your future career aspirations. The students' thoughts below reflect the importance of self-awareness in how to move forward toward personal and professional goals.

Enhancing my personal growth and becoming my best self.

“The interfacing of business and science courses and the diversity of students within the MBS program has helped to widen my professional network. The personal growth from this program has already improved my interactions inside and outside of work.”

“To become a well-rounded person means to go beyond just the business know-how or the technical knowledge. It is to encompass both sides to be able to interact in a way that is meaningful for all parties involved in the team, conversation, or group meeting. By expanding the breadth of our networks, we can gain new perspectives, share knowledge, strengthen business connections, and gain confidence.”

“The MBS experience is crafting modern, ideal individuals. Yes, we are taking those important science classes, getting a flavor of a business-oriented intellect, but we are also becoming our best selves with this experience. There are countless opportunities this program offers to further our own growth and development. The courses are definitely well-crafted and include a wide breadth of values, but we are also asked to attend at least 12 useful and highly beneficial colloquium events that can come in the form of being in on an important discussion, hearing from a panel of leaders, going to career fairs, understanding your own strengths and weaknesses, and so many more. Additionally, the aspect of networking with so many like-minded individuals that practically show you the many career paths there are. The MBS experience is all about tuning into yourself, establishing your aspirations and goals, and providing the support and curriculum to get you there.”

“I am surrounded by peers and professionals in various stages of their careers, specializing in a variety of different subjects, which is beneficial to my personal growth. The things I learn from them are applicable to many life situations beyond just the professional environment.”

Preparing me for the future.

“This degree allows me to gain valuable knowledge and experience in both the areas of people and business management as well as STEM technical fields which helps me be prepared for the future where increasingly, business and technology are combined and complement one another.”

“This program provides the technical and business skills needed and shapes us for the real world.”

We hope that this multi-faceted view of the MBS degree showcases benefits that extend well beyond what you might have imagined!

Developing the Professional Science Master’s Offering

So, given the rewards of the program, what might you imagine are the burning questions that must be addressed to continue to hold itself to a high standard for students to achieve their career objectives?

Once again, we ask the question, do scientists need business experience? And if so, what kind? In looking at science and engineering job postings, it is not uncommon to find that they ask for “baseline business skills,” i.e., budgeting, project management, teamwork, innovation, communication, etc.

So, what does the Professional Science Master’s program offer that creates this wide-ranging set of enhanced skills?

The Professional Science Master’s program (PSM).

The Rutgers PSM program treats business as a core part of the program. Learning outcomes include:

1. Development of an applied technical specialization in a concentration/area of Life Sciences, Engineering, or Computer and Information Sciences.
2. Good analytical, oral, and written communication skills.
3. The connection between technology and business and how technical work impacts the business of organizations.
4. Fundamental concepts of marketing, business strategy, innovation, and entrepreneurship.
5. Finance and accounting basics, able to assess the financial aspects of a new scientific venture or project and make recommendations for investments and payback.
6. The leadership skills needed to inspire, motivate, and coach diverse individuals and teams.
7. The core elements required to design and operate an effective, science-driven organization and how to diagnose and solve organizational problems.
8. The core elements of a business plan and how to plan, execute, and run a project that helps translate a real technology from idea to commercialization.

THE MBS BUSINESS COURSES

As with the science and engineering tracks and concentrations, asking the right questions was critical to creating an appealing program with long-term growth potential and continuing to make it relevant and differentiating.

Here are some of the questions that contributed to the creation of the breadth of the business course offerings and continue to be at the forefront of creating the largest and best MBS degree program in the country. As might be expected, these questions are very similar to the ones being asked by the Executive Director, faculty, and Industry Advisory Board (IAB) members to maintain a successful program. These questions are the ones that the MBS Executive Director faculty and IAB review to create an MBS degree offering with differentiators that make it so relevant and appealing.

1. What are the major job opportunities in the mid-Atlantic/New England area by industry, so that we can prepare our students for these opportunities in their backyard?
2. What companies have their headquarters in this region and, therefore, represent a source of job opportunities?
3. What are the technical/professional skill expectations for the master's degree level versus a bachelor's degree level business graduate?
4. What baseline business skills are employers looking for and need?
5. How do we make the program a real-world experiential? How do we turn "knowledge into know-how"?
6. What trends are shaping the future so that the business offerings, along with the tracks and concentrations, are proactively, not retroactively, responding to marketplace employer needs in real-time or on a timely basis? (How do we adapt our framework to accommodate agile implementation of courses?)
7. How important is it to have industry-experienced faculty teach our students so they will be immediately useful in their positions when they receive their degrees?
8. How broad should the business offerings be to allow our students to pursue major industries but also discover new areas of interest or supplement their current pathway with an unrelated but exciting area?
9. In what other ways should we supplement the business and science curriculum to facilitate the development of our students to be ready to find jobs and be successful in those jobs? For example, by providing ways to apply their classroom learning through coaching, advising, mentoring, networking, teamwork, and providing internships and externships? How do we make the courses multidisciplinary not just interdisciplinary, similar to industry?
10. How do we design a program with our students at the center? How to make it personally relevant to the working professional?
11. Why is having a diverse student body and diverse faculty important?
12. How do we make the program appealing to students from around the world?
13. How important is flexibility to allow our students to take the courses and finish the program on their own timetable? What are the implications of flexibility on faculty and staff resources?

14. How important will it be to constantly monitor what employers are looking for to make sure that our program is fulfilling their needs?
15. How to make ethics an important part of the program?
16. How to give our students a lifelong learning mindset so they are equipped for career development and satisfaction throughout their careers?

Below is the current listing of *Business Courses* that result from the vigilant, continuous exploration by the PSM program for what employers are looking for in their prospective employees that is current to what’s happening in their industries. All of these concentrations and the courses that represent them are tailored by industry professionals to be useful in real-time so that students are well-equipped to make contributions when they leave the program.

BUSINESS COURSE DESCRIPTIONS

BUSINESS COURSES	OVERVIEW & COURSE OBJECTIVES
<p>Principles of Accounting and Finance for Science and Technology Management</p>	<p>This course introduces the concepts of accounting and finance as they apply to STEM-based, science-intensive industries. Topics covered include net present value, projecting capital needs, capital expansion, funding for research and development (R&D) and managing working capital. Students examine, dissect, summarize, interpret, and present solutions for problems posed in case studies based on relevant and current business problems faced by companies in the science and technology sectors. Financial concepts are presented heuristically; financial theory is used as a foundation only as necessary. Case studies and examples provide students with hands-on practice in the application of the course’s concepts to business decisions.</p> <p>By course-end, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand common financial documents (e.g., annual reports). 2. Create a financially sound business plan. 3. Proactively participate in financial and funding discussions whether it be at an established company, an R&D driven start-up, or an academic setting. 4. Use company financial statements to make business, investment, and career decisions. <p>Prepare and communicate the financial part of their Capstone business plan.</p>

Capstone for Science and Technology Management	The Capstone course is a project-based course covering the fundamentals of entrepreneurship, intrapreneurship, innovation commercialization, and intellectual property—ultimately tying together all academic and business knowledge and skills students have obtained throughout the process of earning their Master of Business and Science (MBS) degree. For their projects, students work in teams to analyze technology innovations and creative-related and comprehensive business plans.
Principles of Communication and Leadership	<p>In this course, students are taught communication and leadership strategies used in professional settings. They will formulate a professional development plan based on data collected through self-assessment and self-reflection exercises. They will become familiar with aspects of team dynamics and learn about working in multidisciplinary teams. They will put course-acquired knowledge into practice through experiential learning-focused exercises and assignments.</p> <p>By course end, students will be able to:</p> <ol style="list-style-type: none"> 1. Communication skills for scientists both written and oral. 2. Effective communication and presentation strategies. 3. Communication in a team environment the ability to influence ideas into action. 4. Managerial role transitioning - moving away from the doing without losing the understanding while building better team results. 5. Building personal leadership capabilities. 6. Developing a better version of you to meet the demands of tomorrow.
Fundamentals of Intellectual Property	This course provides essential knowledge in Intellectual Property (IP) for science and engineering students who are driven to succeed with inventions or are interested in IP strategies or patent related professions. The course covers the basic and practical aspects of intellectual property with an emphasis on innovation and entrepreneurship, patent creation process, patent classification, prior art searches, and strategic management of patent portfolios.
Ethics for Science and Technology Management	This course introduces students to the ethical problems unique to STEM-focused business entities. Topics include ethical theories, whistle-blowers, scientific integrity, conflicts of interest and corporate social responsibility. Students will identify ethical lapses from current events and analyze them using the framework taught in class.

<p>Market Assessment and Analysis for Business and Science</p>	<p>This course focuses on the "4P's": product, pricing, promotion, and placement. After taking this course students will study the components of a market analysis and then apply these to develop a marketing strategy. They will be able to assess, analyze and critique marketing strategies relevant to the IT/Digital and Life Science sectors.</p>
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What Business Courses are required for the MBS degree?

As stated in the previous chapter, the MBS degree requires 43 total credits divided between 24 Science credits and 19 Business credits. All students take five core business courses and the Capstone in lieu of a master's in science thesis.

1. Required Courses:
 - a. Principles of Accounting and Finance for Science and Technology Management
 - b. Market Assessment and Analysis for Business and Science
 - c. Intellectual Property (Life Sciences recommended for Life Science students)
 - d. Ethics for Science and Technology Management
 - e. Principles of Communication and Leadership (discussed In Chapter 7)
 - f. Capstone for Science and Technology Management (discussed in Chapter 8)

Industry-wise, experienced instructors.

A key characteristic of MBS business instructors is their relevant and current experience in industry. The instructors in each business course, like the STEM faculty, provide a wealth of knowledge and relevancy, and attempt to be unique in their offerings relative to peer institutions.

One of the goals of these courses is to provide the students with a business language and literacy so that they can participate in cross-functional meetings. These courses are not meant to be a replacement for professional certifications or degrees. Below are some examples of the business courses and the experiential components that make these courses so relevant and appreciated.

Principles of Accounting and Finance for Science and Technology Management

The Accounting and Finance course is meant to help students understand how finance affects business decisions.

This is not a replacement for becoming an accountant or for “rendering an opinion” on company documents as a CPA would be hired to do. By selecting relevant and current business cases, the course has students explore how business plans, analysis, and metrics influence decision-making.

Examples of current case study problems include real marketplace situations.

1. Analyze the recent semiconductor shortage situation and recommend how auto executives should respond.

2. Create corporate shareholder value under positive and negative market conditions or where social responsibility must be taken into consideration.
3. Analyze financial reports and comment on the effects of COVID-19, recession and tax law changes.

As in real life, the experiential aspect of the course encourages thinking through difficult situations with complex tradeoffs and then expressing a point of view. For example, students were asked to consider a situation of high student tuition debt and to determine how much they would have to allocate to pay off the loan in ten years taking into consideration various interest rates. To make it real, they were asked to describe the personal practicalities or tradeoffs they would have to make to make the payments they specified.

As this example demonstrates, a solution requires the student to think numerically (from a financial perspective) and bridge the numerical with a qualitative perspective (what is the problem that is being solved).

Adding to the challenge of creating this solution are the possibilities across countries. For example, China, is not a market-based economy with competitive pricing, so thinking about how business works there will be entirely different than for other countries. The US has accounting standards, FASB, but accounting rules vary by country, so this represents special considerations. Given the constant changing of things, a life-learning mindset is encouraged for a thorough analysis.

Market Assessment and Analysis for Business and Science

Marketing is a very important part of the business of an organization because without it, there would be no revenue generated and there would be no engagement with the product or service by customers. This course shares the basic concept and process of marketing, creating and telling the story about the brand so that it stands out, and provides current and new digital methods for promoting a brand.

Experiential Marketing: An Evening at IKEA

In addition to providing the basic marketing framework and tools, there is a very strong belief in the experiential component of teaching and learning. The best example of that is described in the article, “Experiential Marketing: An Evening at IKEA” by Julianna Rossano.

“For many New Jersey MBS students, a fond memory of the program included visiting the IKEA in Elizabeth for the Market Assessment and Analysis for Business and Science course to learn about the company’s marketing strategies. Online students visit their local IKEA. With a report of retail sales totaling EUR 41.9 billion in 2021, the company sells its iconic furniture alongside furnishings, home goods, and food items. The trip—which included a complimentary dinner—began in the IKEA cafeteria. The following article shares this memorable experience.

Why are students taking a field trip to a furniture store? The professor explains, ‘the big idea is experiential learning. Students will apply what they have learned in their class to a real-world walk around IKEA, incorporating the experience into their final project. They can either do that learning about it in class and reading books or they can actually come here. This really pulls the whole thing together. You are able to see the merchandising, how they staff, how everything really operates, and view it somewhat as a consumer but more so like a consultant would—to really look at what seems to work, maybe what doesn’t work, and really understand how this amazing global brand can pull all this stuff together.’

Because IKEA is known for its experiential marketing tactics, an important area of study for user experience design and product management, makes an in-person visit is crucial.

Students see some of the strategic methods IKEA uses to create a unique shopping experience.

Fully furnished rooms. *IKEA includes a series of rooms on its show floor, inviting customers to walk inside. These rooms include details such as food sitting on a kitchen table, light streaming in through a window, and even children’s drawings on the fridge, all giving the impression that the customer has walked into a real home.*

Invitations to interact. *Signs around the store invite the customer to interact with furniture such as sleeper sofas and sectionals with storage. Closets contain a full wardrobe of clothing, creating a sense of mystery and delight when a customer opens them.*

Brand values. *A brand known for its commitment to sustainability, IKEA invites its customers to adopt these values through signage promoting recycling bins, reusable food containers, and more. This encourages customers to see these not just as objects, but as a commitment to IKEA’s sustainable way of living.*

The cafeteria. *It’s no secret that IKEA’s iconic meatballs drive furniture sales. Offering customers this sensory experience creates an emotional connection between the customer and brand. After all, no one likes shopping on an empty stomach.*

Groupmates capture photos and videos of the showroom and brainstorm ideas to explore in their final project. They tour as consultants, analyzing everything from the signature maze-like showroom to how customers can provide feedback. Students provide feedback to this experience:

‘The thing that I really, truly like about this class is that things that I used to ignore or kind of give a side eye to are what I’m noticing now in the real world because I learned it in this marketing class. How different companies market products, and the behind-the-scenes of before our product is put into marketing, all the work that goes behind it. That’s what I’ve learned, and I’m actually using it in real life if I’m purchasing something online or in person.’

‘Nobody can be a subject matter expert in all the fields. The fact that we get to hear from a subject matter expert for each topic for each week means a lot.’

The professor explains, this visit demonstrates that, ‘At its core, the PSM program values experiential, job-relevant instruction. That’s why we developed our robust internship and externship programs, offer executive coaching, and built our alumni network. After two years of remote instruction, it’s clear that students valued the on-site experience.’”¹

Fundamentals of Intellectual Property (IP)

The PSM program is fortunate to have alumni return to teach classes. The Fundamentals of IP class is taught by an alumnus from the MBS degree program who returned to become an IP instructor.

“I decided to go to graduate school and my college advisor suggested the MBS Program, which at the time was newly formed. The drug discovery and development track in the MBS program was a good fit with the clinical trials and regulatory questions that were of interest to me. I knew I didn’t want a PhD or MS to do research or MBA for a business focus only, but wanted an advanced degree that brought together my science background but allowed me to work in corporate or with entrepreneurs where science impacts society. With the MBS, I could see the impact of science on patients and customers. This turned out to be one of the best experiences of my life. In the leadership class, I learned that you get out what you put into it. It changed me.

I also really enjoyed intellectual properties class and decided to pursue it as a career. Dr. Silver and other faculty were available for valuable discussions.

Toward the end of the program, I took a summer internship with the IP professor. In the last semester he asked me to continue to work for his company and to be a teaching assistant for the course. I really enjoyed the educational component and interactions with the students.

In the intellectual properties course, many people were brought in from industry, so I was able to network with experts in the field. They encouraged me and I decided to get a law degree. I am now in my third year at Rutgers Law School. My goal is to practice law in intellectual property or patent law and perhaps work with entrepreneurs.”

The article, “Inside the US Patent and Trademark Office: An MBS Class Trip,” by Julianna Rossano, shares the experiential learning around intellectual property.

“On Friday, June 29th, MBS students in the course Fundamentals of Intellectual Property took a trip to visit the United States Patent and Trademark Office (USPTO). Located in the beautiful town of Alexandria, Virginia, the USPTO is the federal agency for granting U.S. patents and registering trademarks. In the course Fundamentals of

Intellectual Property, students learn about intellectual property (IP) with an emphasis on intellectual property strategies.

The day began with an introduction to the campus, an executive welcome from Elizabeth Dougherty, Director of the Eastern Regional Outreach Office, and an overview of the USPTO. Students were treated to multiple panels and dialogues with experienced professionals. Four patent examiners discussed their lifestyles, day-to-day activities, and key takeaways of the profession. The audience had a chance to ask questions—including about artificial intelligence and its potential uses in the field.

Up next, Liz Jackson, Managing Attorney of Trademarks, explained the main duties of a trademark examiner, noting what a trademark can and cannot do.

After a lunch break, four USPTO professionals discussed the office’s resources, programs, and initiatives helping to serve underserved communities and to bridge gaps. The USPTO offers programming, both virtual and in-person, to show how IP touches many factors of our lives. View events available to the public on the [USPTO website](#).

Finally, Peter Mehravari, Director of the Global Intellectual Property Academy, discussed international IP protection, enforcement, and education.

The day ended with a tour of the [National Inventors Hall of Fame Museum](#) where students saw a gallery displaying icons of each of the museum's inductees, special exhibits, and even a model Ford Mustang.

Fundamentals of Intellectual Property is an essential course for MBS students who may wish to pursue invention or to work in IP-related professions. Many students from various backgrounds find it useful.

Jessica Aragona, an MBS student pursuing a concentration in Personal Care Science, said that because her background is in science and personal care, she’s never looked into the world of IP and patents. However, she enrolled in the class to learn more about the process of pursuing a patent and how it relates to her field.

‘It’s definitely different,’ said Aragona, ‘but I do enjoy it. It’s really cool to see the people who are behind everything we’ve learned in class.’ She was also excited to learn about the trademark process firsthand from an expert before it was even covered in class. ‘It makes it more human in a sense,’ she added.

MBS alumni Rajan Verma, who graduated in 2023 with a concentration in [Biotechnology and Genomics](#), is currently a Teaching Assistant for the course. He completed the course himself as an MBS student.

As a student taking this class, I had no prior experience in IP or the whole field in general,” said Verma. ‘Taking the class and then becoming a TA and learning even more, it’s really brought a great sense of understanding to how IP affects not just my

field, but all the other fields in the MBS program. It's a foundation for a lot of these scientific-based concentrations. It's really important for students to understand how [IP] works and how it affects them in their careers. I think that this course is a fundamental piece of MBS as a whole and really important for all students to take.'

Although Verma has been involved in this class previously, this was his first time visiting the USPTO office in person. 'I've done this program virtually for two years, and this is my first time coming down here in person. Both pieces are valuable, but coming down here and seeing it for yourself with your own eyes is a lot more valuable. Obviously, you get to make these connections that you wouldn't otherwise in a virtual setting. I think it's really important for students to take advantage of the opportunity when it's given.'"

As these examples demonstrate, experiential learning is alive and well in the MBS degree program. The ability to apply classroom learning is critical for students in helping them gain real-world experience, tailoring their own skill sets for the jobs they will assume, and making them more competitive in the job marketplace.

Ethics for Science and Technology Management

The focus on ethics has never been more important. With the rise in artificial intelligence and advances in the STEM disciplines in combination with the responsibility for business decision-making, understanding ethics is the key to being a good and responsible scientist and engineer.

Many undergraduate programs cover ethics as part of the accreditation however, most graduate programs don't offer it. For MBS students who will have responsibilities that may be domestic and international, the Ethics course is essential and may be one of the most important classes in your MBS experience.

Ethics Course Description

This course discusses the definition and practice of business ethics as it pertains to science/technology-focused organizations. Specific topics covered include: (1) an overview of ethical principles, (2) organizational ethics, (3) corporate social responsibility, and (4) whistleblowers. Rather than addressing the needs and views of the philosophers, academics, and social critics, this course is tailored towards practical aspects of managing ethics as it applies to professional situations, particularly at technical/business interface. The course presents problem-solving approaches and tools and practice using them to assist students in constructing well-reasoned arguments and reaching decisions about how to proceed in the face of ethical lapses and dilemmas.

Course Goals/Objectives

By the end of this course, students will be able to...

1. Define the 3 main ethical theories and the 2 main perspectives used in business ethics.

2. Have a working understanding of several frameworks for analyzing workplace-based ethical dilemmas.
3. Understand the impact of unethical business behavior in science- and/or technology-focused organizations.
4. Describe the federally mandated laws and guidelines that govern business ethics and whistle-blowers.
5. Addressing ethical issues in professional practice of science and engineering. See the next chapter on the Capstone for additional comments.

Summary.

As was true with the science offerings, the business curriculum delivers knowledge and experiences at a master's degree level that has vast implications for the student's satisfaction with the learning and as a result, tremendous personal and professional growth.

The business offerings provide the language and literacy to distinguish this compelling, unique proposition of the Master of Business and Science degree and create new opportunities for business and science to come together.

As you look through the offerings, consider not only those courses that will help you with your current job but also ones that pique your interest or would be valuable to you at some point in the future.

Take time to acknowledge that the MBS degree program is providing you with opportunities to stretch your thinking and explore varied experiences that provide you with valuable insights for contributions and advancement in your current job prospects, as well as how this program contributes to your lifelong learning process.

The Plays

Think about how you created your personalized MBS degree program and what business courses you think you might want or need, not just currently but in the future.

Carefully consider these questions for each of your Odyssey Plans: 1, 2, 3 that you developed in Chapter 2 Plays and Chapter 4 Plays.

8. What business skills will you need to address your overall goals represented by the question, “Why are you pursuing the MBS degree?” (See Chapter 3 “Plays” for your response.)

9. What transferable skills will you need for each of your Odyssey Plans 1, 2, 3?

10. Reviewing the postings for the jobs that represent your Odyssey Plans 1 and 2, what “baseline” or business skills were listed in those postings? What business courses match the skills that are needed?

11. What courses will you need to complete your degree for each of your Odyssey Plans 1 and 2?

12. What courses/concentrations could you *add* to your current business or transferable skill areas of expertise?

13. What different courses/concentrations might *expand* your current business or transferable skill areas of expertise?

14. What courses/tracks might you explore out of *interest or passion or enhance what you are good at, unrelated to your current area of pursuit*? What courses pique your interest? (Consider your Odyssey 3 option)

15. Where do you envision yourself to be in 5 years? In 10 years? How might this envisioning affect the business courses you are considering?

16. What did you learn and what experiences did you have that you considered to be valuable in your life and job related to diversity, inclusion, and belonging?

17. What did you learn about ethics and its application to your jobs?

CHAPTER 5: NOTES

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1. Julianna Rossano, “Experiential Marketing: An Evening at IKEA,” *Rutgers University Professional Science Master’s Program, Master of Business and Science Degree blog post*, November 7, 2022, <https://mbs.rutgers.edu/article/experiential-marketing-evening-ikea>.
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Chapter 6

Externships and Internships

Where the Classroom Meets Real-Life

“Happiness = f(Form + Function) x User Experience.” Dr. Rupananda Misra

The Master of Business and Science degree has been described as a program that is “more 3D than 2D.” It’s 3-dimensional because, as this formula suggests, the MBS experience is not only the presentation of well-designed courses (reflecting form and function), but it equally values a third important component, the “user experience,” i.e., to practice what you’ve been taught. “User experience is the final hurdle to happiness, reflecting satisfaction, joy, and well-being,” says Dr. Misra.

Having focused on the STEM tracks in Chapter 4 and on the business courses in Chapter 5, the focus of this chapter is on the interaction of these offerings with a more in-depth exploration of the user experience represented by externships and internships. In addition to teaching UXD, MBS applied UXD to its creation and design (another way of saying this—we practice what we preach!)

Dr. Misra, the coordinator for the UXD (User Experience Design) concentration, provides the following high-level discussion of this formula and its component parts.

*“**Function** is the offering of the object, what it can do, and what it ought to do. It is the duty of the administrators, faculty, staff, and others to deliver education. Given its fundamental role, there is a perceived importance in this product or experience. The MBS’s function is to deliver education and training through awareness of your holistic needs (academically, but also ethics, environment, experiences, etc.) and for the purpose of maximizing your potential.*

***Form** is about the physical manifestation of the product or object. It delivers beauty in a way that ‘you love’ or in a way that addresses your MBS goals in a pleasing way. For the MBS program, it is important to understand why, when, and how this aspect should be manifested based on what the department stands for and the needs of its students. Delivery and projection of the form, i.e., the aesthetic or beauty of the MBS function, is a very important component of happiness because the more you love the experience, the more you will want to engage and interact with it. Form can be diminished if the function is restricted.*

*The MBS **user experience** is delivered through a ‘lived experience.’ It is the result of interactions with the outside world and within us. For the MBS degree program, externships, internships, networking, colloquia, events, the capstone and class trips, etc.*

represent 'lived experiences.' These experiences are opportunities for you to practice what is delivered through the function (education) and form (aesthetic). The user experience tells you if the form and function match what you expected these to deliver in the gaining of skills and the emotional reaction during and after the experience. It is the positive or negative perception of the user experience that will influence what you will remember of the overall product or process because the user experience can overpower the perceptions you have of the form or function of the process or product.

The user experience is meant to elevate the human condition. The user experience is the final hurdle to a positive customer experience. When you are interacting with a product, it should seem flexible, intuitive, seamless, caring, and empathetic. If the form, function, and user experience are delivered well, there is joy, control, and a sense of happiness. This produces long-lasting memories. MBS attempts to design a true customer experience that shows it cares about the design and delivery of the user experience. With the MBS faculty and staff focused on supporting experiential learning, this provides a platform where you can feel confident and possess the inner strength to be successful when you join the workforce. This leads to happiness.

What the MBS experience teaches is "how to learn and unlearn" or "how to learn and relearn" over time and for any challenge you might encounter. The MBS degree program is not meant to be a moment in time, but one to elongate, to make it a state of being, to have it stay longer with you.

***Effort** has a role to play in the lived experience. That is, one must put in the effort and be consciously involved. Effort (by faculty and staff) is provided through the creation of a pleasing form and functional product in the MBS degree program. For example, in the MBS Externship Exchange, the following experience is created: the program is run by experienced faculty and staff and structured to provide a great experience for students and companies. The program brings in corporate mentors who bring in important and good products that have real value and big challenges. Advisors work with the externship teams. And student support is used. For a positive experience, effort is required on the student's part. You must do your part. If you put in effort, there will be fulfillment and happiness."*

To reiterate, without a doubt, classroom learning is important and foundational. However, "experiential learning," defined as "learning by doing," comes in many forms and is one of the defining characteristics of the MBS degree program. In experiential learning, students acquire and apply technical abilities, transferable skills, and competencies in a relevant workplace-like setting. The experiential learning is part of the coursework but is also offered in several other forms, i.e., externships and internships. Being able to experience and apply classroom learning to real-world situations is equally critical for ensuring success in your job.

Experiential learning is especially important in technology and engineering. These fields are best thought of as sports - you can spend hours in the classroom learning about programming or engineering calculations, but unless you actually "do it," you will not really be able to function. Nobody will choose a teammate for a sports game, professional or otherwise, for someone who got an "A" in a written sports test. Good teammates must be able to show their capabilities on the playing field.

The Externship and Internship Programs are specific, integrated examples of “form,” “function,” and “user experiences” that provide the opportunities for you not only to bring your MBS technical classroom skills onto the business playing field but to practice your managerial skills needed to create winning outcomes. The totality of the experience that includes real-world practice makes MBS students more valuable and more competitive hires because they’ve had this practical experience before applying for job positions.

THE EXTERNSHIP EXCHANGE PROGRAM

The MBS Externship Exchange Program is an experiential learning initiative where you engage with organizations, gain mentoring, and receive professional experience by working on real problems and challenges. These programs add substantially to your classroom learning by allowing you to practice and gain exposure to real business situations. It’s called an “exchange” because interested organizations or companies can post projects, and the MBS program matches the projects with groups of interested students.

Externships are unpaid opportunities for you to hone your skills in your concentration, major, or in an industry of interest. You typically work 8-10 hours per week over the semester and are completed on campus and or remotely. For many of the concentrations, the externships provide material for portfolios.

The projects are provided by partner organizations. These partnerships include startups, mid-sized companies, Fortune 1000 corporations, non-profits, government agencies, and academic units. You are matched to small projects in teams ranging in size from two to nine students each semester. There is a lab every week where you learn the skills needed to succeed in your externship experience, e.g., team development, presentation skills, project management, and the language used in an industry. This is an interdisciplinary course, so you learn from your other classmates, too.

The MBS Externship Exchange has a winning formula for success.

The MBS Externship Exchange, which continues to grow exponentially, is a great success story. At the beginning of the program, the Externship Exchange initially consisted of one advisor, four students, one project, and one partner organization. In 2023, the program has grown considerably to more than 150 students (Fall, Spring, Summer) and is supported by numerous adjunct faculty members and student workers.

The appeal of this experience is that it is open to all MBS students and is an excellent way for you to gain hands-on experience in your intended careers or investigate entirely different career interests. With projects completed through multidisciplinary teamwork, you not only discover solutions via collective and disparate perspectives, but you do so through an accurate real-world move toward a problem-solving approach.

Externships can be used by non-working students to gain experiential learning and by working students to increase their level of skills. For example, one student who was working for one company did an externship at a not-for-profit and incorporated those ideas into her current company.

Externships are also an opportunity to build up your portfolio. For example, in areas like UXD and analytics, you can work on many different projects in those data-intensive fields to expand your skillsets and learning and perhaps even discover new areas of interest!

Some of the benefits of the Externship Exchange Experience:

1. Learn project management techniques, team development and collaboration, presentation design, and key presenting skills.
2. Gain experience in an industry of interest or try out a new field with no risk or experience necessary.
3. Learn new skills from an externship project that can be applied to the student's current working situation.
4. Build an experienced portfolio, e.g., UXD and Analytics, having worked on many different projects in those data-intensive fields.
5. Volunteer to be a Team Lead (optional) and learn how to conduct meetings, take meeting minutes, and effectively communicate between mentors, student team, and advisors.
6. Practice networking with advisors, mentors, students, and prior alumni while also learning how to pitch yourself and your work experiences.
7. Receive resume and LinkedIn profile coaching and feedback.
8. Recognition awards. The Externship awards outstanding effort with fellowship grants, gift cards, and certificates to add to your resume.

As you and your team take projects from start to finish, you are directed by both an MBS academic advisor and a company mentor from the organization to which you are assigned. You also attend structured, intensive professional development workshops, a hallmark of the MBS degree program, throughout the semester. The projects can continue over multiple semesters for credit or non-credit.

The program is successful because the academic advisors are Rutgers faculty, researchers, and staff or alumni of the MBS program. All are dedicated to ensuring the students are meeting with the company and that the projects have a "design goal." The program wants companies to have you work on meaningful projects to ensure accountability and provide a great overall learning experience for you, as well as the mentors.

This unique opportunity allows you to gain practical, hands-on work experience at some of the world's leading corporations and organizations while also receiving specialized instruction on topics including leadership, teamwork, problem-solving, and giving effective presentations, such as the semester-end "Lightning Talks." In these situations, you discuss how you use your problem-solving skills to work on non-hypothetical, complex projects for a star-studded lineup of companies, both big and small, across a range of industries, including:

Companies providing opportunities.

As mentioned earlier, students have the opportunity to work with public and private companies representing a range of industries, government and non-profit organizations, digital companies, and cities.

Most projects are confidential, but here is a small representation of the kinds of companies and projects worked on by students.

1. **Bayer Pharmaceuticals:** Students investigated sustainable packaging solutions for Bayer's domestic shipping supply chain.
2. **Conrail:** Students conducted research into railroad grade crossing safety solutions, aggregated detection and protection ideas from Europe, Asia, Australia, and the US.
3. **NJ Cybersecurity & Communication Integration Cell:** Using platforms such as Chronicle, BigQuery, and Looker, the student team created dashboards to display information on cyber threats for the state of NJ.
4. **PharmAllies:** A regulatory compliance consulting firm specializing in Project Management, Operational Excellence, and Quality Compliance.
5. **Ingredion:** The team conducted research and interviewed industry experts to identify the standards of the food and beverage industry to help Ingredion become a more sustainable company.
6. **Rutgers Recreation and Athletics:** Students leveraged data in available reports from the Rutgers Recreation hourly payroll system to examine student employment variables and trends such as employee retention and gap semesters.

Other internships and externships have been offered by this diverse group of companies and organizations: Affinity Asset Advisors, Bentley Laboratories, Broadcast Music Inc., CGI, Chelo, Church & Dwight, CitiVentures, Colgate Palmolive, Crewasis, Edgewell Personal Care, Fidelis Animal Health, FlexPro, Harmony Biosciences, Immunomedics, Infragistics, Iron Skillet, Joya, Kraus Farms, L'Oreal, NJ Transit, Nested Knowledge, Organon, PSEG, Secure Family Initiative, SEPSIS Alliance, Sesame Street Workshop, Six Thirty, Stryker Medical, Symrise, That Beetch, The Borough of New Wilmington PA, Union County Kentucky, and Wakefern.

Students Share Their Externships.

Due to the application of classroom learning in a real-time business setting, future employers see the value of your MBS experience, making you more valuable and a more competitive hire. MBS students are so much farther along in contributing or being a leader than someone coming out with just a degree and no business experience. Below are some examples of student experiences and the benefits of the externship experiences.

B.P., MBS '18

B.P., MBS'18 had an undergraduate degree in Economics and Statistics. After ten years of work experience as an analyst in the telecom and banking sector, he enrolled in the MBS program with a concentration in Analytics: Discovery Informatics and Data Sciences.

The recipient of a Fulbright Scholarship, B.P. maximized MBS's experiential learning opportunities by participating in the Externship Exchange program. He learned from his decade of work experience that he was not ready to apply his education to answer real-world problems, but by improving his business skills he could build his portfolio beyond his educational degree. In his role as an extern analyst at the New York City Department of Information Technology and Telecommunications (DoITT), he applied his analytical skills in support of cost optimization, efficiency, and other strategic initiatives. He further took up the role as a data scientist at *Forbes* magazine to build machine-learning models for improving performance of *Forbes's* articles based on distribution and consumption of articles using pattern-identification metrics.

B.P. didn't stop at exploring data for classroom assignments or externship requirements but applied the skills he developed through the Business Intelligence and Visual Analytics course to solve a government budget-related issue in Haiti. He shared his findings with the Haitian Parliament, after which he was invited to help the government of Haiti. This led him to his current role at the World Bank as an analytics consultant with the Equitable Growth, Finance and Institutions team where he currently develops analytical platforms and web applications and trains government clients to facilitate accessibility of worldwide government budget data.

B.P. says that the problem-solving skills he honed through the MBS program, as well as his ongoing inquisitiveness, his desire to gain knowledge, and his ongoing self-evaluation and striving for improvement led him to where he is today. He says he strives every day to be better than yesterday by competing with himself, not anyone else, and reminded us that each day is a new opportunity for success.

Key Insights:

1. Whoever learns the fastest wins!
2. Risk is not what you see coming.
3. Your network is your net worth. Your skills are important, but it is more important to have a strong network.
4. Don't wait for an opportunity, create it.
5. Take the value-added offer and be so great that they can't ignore you.¹

Ankit Sharma, MBS '23

In an article by Julianna Rossano, "Making a Difference: MBS Student Receives Fellowship," this graduate shares his story of how his externship made a difference.

Ankit did his undergraduate studies in physics and math in India. He was hired to do logistics out of college, where he worked for several years. In this position, he was responsible for helping companies transport goods across various routes while conforming to the rules and regulations needed for proper delivery.

During COVID-19, he decided to go to business school and applied in the US because his brother was going to Rutgers to pursue a PhD. “There are lots of entrepreneurs in my family, but no one had a business degree, they all had PhDs. They told me that the biggest problem was that they had no business training, e.g., finance, accounting, marketing.” So that gave Ankit the idea to pursue the MBS at Rutgers.

His friends and family told him to continue in the supply chain business, but he wanted to learn something new. Cybersecurity, social media, and data analytics seemed more interesting to him. He took the courses and decided that data science best fit his interests because it could be used in many areas of interest to him. In particular, he pursued artificial intelligence, a good area to apply his interests and capabilities in math and statistics. The fact that he was able to meet employers in these fields, i.e., cybersecurity, data analytics, AI and these areas showed a relatively good return on investment, which made them attractive. He was able to learn new skills and get a good job. This was also a pathway to “entrepreneurship,” which was part of his DNA.

He indicated that the externship experience provided practical experiences from “day one” and he was able to work on problems that needed fixing without being too restricted. He started in the Summer and has continued through three externships. The firms continue to provide him with experiences because of the value he provides the company.

From his perspective, he gets different projects, so there have always been new things to learn, and the company benefits from his problem-solving and managerial effectiveness. At the same time, he enhances his technical, management, and presentation skills.

His externship opportunities have allowed him to work with a team on ECPAT for traffic patterns in Albuquerque, New Mexico, and for Rutgers Rail Transport on the incidents associated with trespassing. He was able to write two papers, one on his team’s findings and a second paper to be written on the use of new technologies.

From this, he was given the opportunity to work on a new venture-funded project and was given a financial award for this work. This large project involves participants from different colleges (outside of Rutgers). He is looking forward to working with and learning from these new team members.

What is in store for him once he receives his degree? He hopes to be able to be hired by a consulting company, having enjoyed working on a variety of projects with a team of people.

He attributes his success thus far to various parts of the program: the mentorship, the externship experiences to learn and try out new and different things, and meeting a lot of different types of people—not just in the classroom but working with them in various industries. His externship experience allowed him to give back to society by solving

problems that started from scratch and having the ability to write papers based on his findings. He received leadership skill training that helped him understand and learn to delegate versus micromanage, how to make an impact on the organizational goals, how to manage different types of people, and how to manage conflict.

Given these experiences, he feels somewhat confident that at job fairs, his resume will compare favorably to others because of his courses and wealth of externship experiences that allowed him to experience, encounter, and solve real-world experiences in pharma, computer science, and cybersecurity.²

Meet and network with industry professionals.

By the project's completion, company mentors often serve as references for MBS students. These references help you to obtain internships or full-time positions (not necessarily at the externship company). Externships enhance your resume and LinkedIn profile with real experience! Some companies will fast-track the student's resume to Human Resources, as explained by a student below.

“The Externship course in the Professional Science Master’s program opened my career door. It has provided me with many opportunities to build real-world project experiences. Through those experiences and many amazing advisors’ support, not only did I strengthen my professional skills, but also, I got to learn more about myself as a person. And that really helped me a lot when applying for this fellowship because I felt confident that this is something I value and a place I want to be a part of.” (Y.L., MBS '23, Analytics: Discovery Infomatics and Data Science.)

It's a win-win.

Why do companies like to participate in the Externship Exchange? It's a win-win all around. The company or organization has the opportunity to work with students to support an existing idea, see what is on the horizon, investigate new ideas, and lead a team of thinkers. And the company mentor has an opportunity to enhance her/his leadership and teaching skills, as well!

INTERNSHIP EXPERIENCES

The Internship Program is similar to the Externship Program in that it provides you with an integration of professional and academic/research experience through internships with employers.

You can gain credit for work by adding this course. (i.e., international students must take an internship course to do CPT). In addition to doing an internship at your place of employment, the course also allows, uniquely, the ability to take the internship course while still working at your current company, *but in a different division*. (A new “boss” has to be identified, and they are the ones who help grade the project.) This can be an important and unique benefit of the MBS

internship because it allows you to do a project where you work, but by working in another department, it increases your skill set and allows you to get to know the company better. This is not only convenient but a valuable addition to your resume as one student explains below.

“I want to commend the PSM program for giving me an amazing opportunity to combine my science concentration with business courses that I want to take which could help me develop and expand my future career together. During the two years, I learned a lot beyond the science courses and took an internship which taught me how to put the methods I took from classes into practice. In most professional fields, business skills are equally important to scientific technology, the courses from PSM program are designed to adapt those business methods to fit professional situations, which I think is the most valued point that I appreciate a lot.” (T.W., International Agriculture)

By the end of this course, you will be able to...

1. Acquire hands-on experience applying classroom knowledge on the job.
2. Verify career and degree choices.
3. Develop presentations.
4. Enhance interviewing and job search skills.
5. Learn tools for managing up, team development, crucial conversations, and addressing professional challenges.
6. Create an experience that helps further design your desired career.

Both externships and internships allow you to explore and develop your technical skills and management skills, and learn more about yourself in “a safe setting” provided through this program environment. You are able to test out technical and managerial skills in a complex, demanding, real-world situation and adjust or identify gaps to be filled *before* applying for and getting a job.

The MBS program further supports your success through instruction in the classroom and interactions with an MBS-supportive community, including a host of mentors, advisors, coaches, faculty, staff, alumni, and fellow colleagues in team projects.

Here is a great example of a student who used her internship to explore other areas of interest that ended up leading to a whole new career direction!

Christina Pellicane MBS '12

Christina is currently the Assistant Director of Innovation and Lead Instructor, I-Corps Northeast Hub at Princeton University. As Assistant Director, she is responsible for supporting emerging entrepreneurs and innovators and developing and executing programming for Princeton

Innovation, the University-wide initiative to expand the beneficial impacts of Princeton's missions of research, education, and service through innovation and entrepreneurship.

As the Lead Instructor for NSF Innovation-Corps (I-Corps) Northeast Hub, she guides the creation of the Hub's educational and training programs for faculty, staff, and student researchers from Princeton as well as the Hub's nine partner institutions and additional participants throughout the region. The Hub is the center for entrepreneurial training to develop and grow the nation's capacity to transform scientific discoveries into tangible societal benefits. She recruits, staffs, and evaluates potential instructors, trains new instructors and mentors, and oversees the recruitment of participants into the I-Corps training program.

Below is her impressive career path.

Her Academic Journey

Christina received her undergraduate degree from the University of Georgia with a BS in Biology and a minor in animal science. At the time, she considered becoming a veterinarian.

Upon graduation, however, she decided that she needed to find a job and headed to New Jersey, where she took a job working in a tissue transfer lab. It was biology-related but more like "manufacturing and not that interesting to me at the time."

She hadn't forgotten that she wanted more education, so she went to a career fair and discovered this "new degree" that combined science and business and offered a concentration in genetics.

"I loved genetics since I was in grade school. So, the fact that Rutgers had a concentration in Biotech and Genomics seemed perfect. The combination of both science and business was intriguing to me and then having the concentration of biotech and genomics made it exciting!"

During her time in the MBS degree program from 2010-2012, not only was she going to school full-time, but she also worked both full-time and part-time jobs. She appreciated the MBS program for being so flexible and allowing her to accommodate her schedule. She also loved the broad offering of classes and the experiential learning provided by the internships and externships.

"The internship experience was pivotal for my career. It set me on a path that led me to where I am today at Princeton."

During my time as an MBS student, I was working as a researcher in a small biotech firm. There were two of us looking at cardiovascular diseases and trying to identify biomarkers. It was pure science, but surprisingly not as fulfilling to me as I thought it might be. I felt very removed from the end goal of making an impact in the world. At the time, we were also working with patent attorneys who were supporting bringing products to market. It was attractive to me, so I asked if I could be more involved in that process."

The intellectual property (IP) attorneys were part of the parent company, so a much larger entity. The Chief IP Counsel agreed to allow me to do an internship with him and he taught me so much about the process, the strategy, and case law examples. It was really fun!

By the end of my internship, I was presenting this kind of information to CEOs of several large biotech companies! The IP attorney, my internship mentor, told me that if I wanted to continue with this work, I would have to go to law school which I didn't want to do. But I really enjoyed this work. I knew this is what I wanted to do, so I asked who I could meet to stay involved in this kind of field.

He introduced me to a colleague of his and fortuitously, that individual had just received a grant for commercializing research. The job was at CUNY, and I was hired as the inaugural Executive Manager for the initiative. My responsibility was to build out the program from the ground floor up. Initially, he and I were responsible for everything: recruiting, creating an organizational structure, managing a large budget, and driving all over to recruit university research programs to participate. During the time I was Executive Manager, we added about 25 universities to the consortium, and we trained hundreds of deep tech teams across the Northeast on how to commercialize their innovations. I made some fantastic connections with entrepreneurship program managers, tech transfer officers, government officials and founders of startups spinning out of universities. I was working with these brilliant researchers to make lives better, not just publish research papers. It was so exhilarating!”

Christina held that position from 2013 to 2016 when she left to go to the University of Delaware, where she took the position as the Director of Commercialization at the University of Delaware (UD)'s Horn Entrepreneurship Center. She was the program's first director and employed the same skill sets developed in her previous job. She had a large budget and managed a Proof of Concept (POC) fund, the UD NSF I-Corps Site, the Venture Mentoring Service, and several other initiatives. The POC fund she developed and led supported 32 teams from which 25 new companies were created with significant follow-on funding generated. She held this position until 2020 before taking a “sabbatical” to travel and do some part-time consulting.

In 2021, took the position at Princeton University that she holds today. In accepting the position, her press release described her as “a leader in academic entrepreneurship.”

“Pellicane brings more than a decade of experience in supporting technology entrepreneurs in academia as well as experience in industry and business development. Pellicane is a nationally certified NSF I-Corps Instructor and leader in entrepreneurship education. Most recently, Pellicane was the first director of commercialization for the University of Delaware (UD)'s Horn Entrepreneurship Center, managing several initiatives including a \$2M Proof of Concept fund and the UD I-Corps site. A patented inventor, Pellicane serves as chief operating officer of Lignolix, a chemical tech startup.”

While participating in an internship that is part of the job where you are currently working makes sense to many, but this is a very compelling story for why participating in an internship can complement your interests or provide you with experiences that add to your skill set outside of your current job or set you onto a whole new rewarding career path!

Summary.

The value of Externships and Internships can't be overstated. These experiential opportunities provide you with the ability to apply your classroom learning in real-life settings. This will allow you to test out various methods for achieving success to see how they work out in various situations. Being able to try out various methods with others who are there to help you will not only enhance your competence but also increase your level of confidence before you secure your next position.

Take advantage of these situations to learn from others who are excited to share these opportunities with you. Inherent in this opportunity is a strong growth mindset. This is the perfect opportunity to discover, learn, question and share about processes and structures as well as philosophies that will benefit you in your next position.

The Plays

Play 1: Identifying Strategic, Real Work-Life Experiences

1. What are you looking for in your externship/internship experience? Consider the Theoretical/Broad vs. Concrete/Specific Skills.
2. What kinds of experiences would help reinforce your existing skill set?
3. What kinds of experiences would provide you with new and different contexts to learn something new or put you outside of your comfort zone?
4. How do you define “success” in this applied experience? How will you know if this experience was successful or not?
5. To what extent are you open to learning more about yourself—your strengths and areas of opportunity as well as learning more about a business skill set?
6. What beliefs do you hold that prevent you from taking full advantage of this experience?

Play 2: Create a list of ideas and behaviors of things that you learned from your Externship(s) and Internship(s) that you will be able to use in your resume, interviews, and on the job. (Think about these items as they apply to your Odyssey 1, 2, and 3 plans).

1. Describe the project and date.

CHAPTER 6: NOTES

Thanks to those who were interviewed or quoted for this chapter: Rupananda Misra, Christie Nelson, Karen Bemis, Caroline Thorpe, Abbe Rosenthal, Julianna Rossano, Matthew Brennan, Christina Pellicane, Ankit Sharma, Beethoven Plaisir, *Kruttika Raman*, Yihuang Li, Tianxin Wu.

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4. Julianna Rossano, “*Making a Difference: MBS Student Receives Scholarship*,” *Rutgers University Professional Science Master’s Program, Master of Business and Science Degree blog post*, February 27, 2023, <https://mbs.rutgers.edu/article/making-difference-mbs-student-receives-fellowship>.

Chapter 7

Leadership and Communication Skills

Where Self-Awareness Meets Impact

"Leadership = Lead your own ship, before you can lead others." Kathleen Cashman-Walter

Learning communication and leadership skills.

The objective of the MBS program is to help you find your niche and make an impact. Developing communication and leadership skills is critical to helping you make the impact you desire. These skills require a mix of theoretical understanding, practical application, and self-awareness regarding your interests, talents, and opportunities.

The best outcomes involve exploration, participation, interaction, and getting out of your comfort zone. It relies heavily on you embracing the concepts and committing to action.

Because the world is constantly evolving, so too, should your communication and leadership skills. Are you willing "to do to learn, grow, create opportunity, and move forward toward your future?"

Exploration of communication and leadership.

In the Communication and Leadership class, developing communication and leadership skills begins with an understanding of the dynamics of the 21st-century business environment in a wide variety of organizational settings. Key questions are explored:

1. Who am I? What communication and leadership skills do I have and need?
2. What is leadership? What challenges do leaders face at all levels, what impact does leadership have, and how do leaders build organizations and key relationships?
3. How can I become a better leader today? How can I get recognized for leadership contributions that will expand my abilities to engage in larger conversations while building relationships that work?
4. How can I become a better communicator? What are all the ways in which I can create better messages, send better messages, and ensure they are reaching the key stakeholders to achieve the results I require?

Emphasis in the course is placed on self-awareness, awareness of others, approaches, and building perspectives, experiences, and applications. Learning how to "lead your own ship," as

well as how to lead others, results in building better relationships that work to create desired impact and outcomes. This is the key to developing your personal communication and leadership skills and your personal brand.

"How To" enhance communications and leadership.

The overarching objective of developing communication and leadership skills is to create impact or value-added business results that matter.

Discussions are led by experts in a field, i.e., someone with current experience who will help you be more effective in your interactions and in building relationships that are key to successful impact. Some of those topics include:

1. Leadership Defined: Traits, Behavioral Skills, All About Your Leadership Style
2. Communication Assessments
3. Influence and Communication
4. Leadership Communication and You
5. Teams that Work
6. Diversity, Equity, and Inclusion
7. Adding Value
8. Building Relationships That Work
9. The Mindset of a Leader
10. The Challenges We Face
11. The Power of the Positive Employee Experience
12. Change, Resilience, and Impact
13. Decision-Making, Negotiation, and Conflict

The MBS Communication and Leadership experience is meant to include a variety of content, exercises, experiences, and tools that will prepare you for your next career move. Those include:

1. Understanding your personal strengths and weaknesses and aligning personal traits and qualities with the type of leader you want to become.
2. Interviewing leaders is a "secret weapon" and a great opportunity to get exposure to more senior managers in your organization and explore contributing factors to successful leadership practices.
3. Developing and applying skills to achieve organizational results.
4. Igniting and developing leadership relationships, including mentoring relationships.
5. Creating plans to measure leadership results and how to communicate them.
6. Learning how to enhance your skills in group and team collaboration.
7. Becoming comfortable and skilled in communicating...writing and speaking, prepared and extemporaneously.
8. Building your brand by finding your voice so that your audience can see your leadership brand.

Here's how Christopher Smith, MBS '25, Drug Discovery & Development, described the benefits of the learning experience.

***"The class serves as a call to action** for those looking to make an impact in their careers before the course even concludes. If you want to learn how to get the most out of this class, take note of the key insights below.*

***Step outside your comfort zone.** Projects and group tasks are specifically designed to challenge each student in this course. You'll feel more comfortable reaching out to strangers, professionally and academically, especially those in senior-level positions. If you allow it, your contributions during meetings will change, and even your demeanor in the workplace will shift.*

***Rethink what you've learned about communication and leadership.** This class provides tools and assignments to expand your understanding of both these areas and ensure they develop throughout the duration of the course. After completing this particular MBS course, my understanding and perspective on communicating and leading has drastically improved.*

***Don't just attend class. Start applying what you learn right away.** Shortly after this course starts, you can begin using the skills covered in class in and outside of the workplace. You'll quickly learn the benefits of completing these innovative requirements. Ultimately, you'll find that it's one of the most useful courses in the entire MBS program.*

***The lessons learned make each student a better communicator and leader.** I feel I have grasped and encompassed more leadership attributes as a direct result of taking this course than I have in years of working full-time. There are many principles that can be gained from the workplace, but seldom will you learn more about communicating like a leader in a short period of time than you will in this course.*

***You grow as a person.** I no longer shy away from opportunities that drive me outside my comfort zone in and outside of my job, but actively seek them out in order to grow as a leader and individual. I have started to crave chances where I get to show off the technical abilities I've learned in this course about presenting, addressing different personality types, and displaying leadership in multiple facets of my life.*

Even if this course were an elective for the MBS program, I would strongly suggest taking this class for each professional student that wants to grow in innumerable ways. I have no doubt that my career and education have already been—and will continue to be—bolstered by everything I've learned from this class. I was already a driven person before this class and now, I truly believe my future endeavors will be enhanced due to the time I spent with the course materials and learning from and with my peers. The seed to learn more about leadership principles and help others grow has been planted, and I plan to keep watering it for many years to come." ¹

MBS Communication and Leadership...Executive coaching is the "secret sauce."

You've gotten a glimpse of the MBS communication and leadership fundamentals, but the MBS degree program's "secret sauce" or "differentiator" is the use of executive coaches. Executive coaches are the key to building communication and leadership skills by helping you more effectively and efficiently build on your strengths and navigate the challenging situations you may encounter.

They do this from your perspective identified by your own self-awareness. In most business schools, leadership courses teach leadership skills and strategy, but the "secret sauce" of the MBS program is the use of executive coaches, as instructors and as coaches to help you more effectively incorporate the skills that you uniquely need.

What executive coaches do.

In the business world, executive coaches have been used for a long time for the benefit they provide to individual employees in helping them become more effective in the workplace. An executive coach is trained and credentialed to help employees become better versions of themselves by addressing obstacles that prevent them from doing their best job, e.g., how to work more effectively with their bosses or colleagues who report to them or learning new ways of leading that are a good fit with the employee's existing way of interacting with others. Executive coaches can help with time management issues, motivating others, or dealing with any of the situations that confront employees at any level on a daily basis.

How executive coaches enhance the communication and leadership experience.

The MBS degree program observed that industry employers recognized the benefit of providing executive coaching to their employees, so it concluded that the MBS program should offer executive coaching to its students. The "differentiator" or what makes the MBS leadership course unique is how executive coaches help you personalize your own leadership style by understanding that you bring something different to your MBS experience or job and have different challenges to address. So, you are better able to take the communication and leadership learning and apply it to your own situation.

Coaching is integrated throughout the MBS experience. All students get individualized coaching as part of the leadership class (which is taught by coaches, and all students participate in coaching during the class), and then optionally throughout the program through events.

Since an executive coach is trained to ask questions that create self-awareness, self-reflection, and self-inquiry, the teaching style of these instructors is different. The goal is for this teaching style to become a learning style for the student so that "being curious" becomes a natural habit for approaching learning in general. This infusion of executive coaching (and DYL, which is described in Chapter 9) into the MBS culture also promotes a lifelong learning mindset that will benefit students long after they've left the program.

Students Speak Out.

In business and so many other activities, not only can communication and leadership be learned, but they must also be practiced. There are many opportunities to learn and practice communication and leadership in the MBS program, from group projects, internships, externships, and in the leadership class. You can't lead unless you understand your strengths and weaknesses and how to apply them in a real-world setting.

Here are four individuals from the MBS Program who enhanced their leadership skills while pursuing their own career aspirations.

Ahn Tran MBS '15

"I was an undergraduate chemistry major, and my first job was in a medical lab. But it was lonely working in the hospital lab, so I decided I would have to go back to school and started looking for a program with more of a business side perhaps in beauty or personal care. After starting the MBS Program, a friend of mine told me that I should go to the Engineering Job Fair, where companies like Johnson & Johnson and L'Oreal would be in attendance.

The first question they asked was, 'What do you want to do?' I didn't know. So, they showed me a job in NYC for an internship position as a project manager. I was also going to school at the same time and couldn't give 100% to each, so I focused on the job. However, I worked really hard in school and graduated in May 2015 and received a job offer from L'Oreal in product improvement for beauty care products.

Thinking back on it, the Communication and Leadership course, one hundred percent, helped me a lot in my internship and with my presentation skills as did the Finance and Accounting course.

After L'Oreal, I took a position at Kiehl's which is a consumer skin care company and worked in consumer use and innovation. I learned a lot there and decided to move to Tarte Cosmetics in project management.

This was so exciting, fast paced, I was won over. It will be six years in May. I was a manager and hoped to become a Senior Director which I have achieved. I've had the opportunity for a lot of growth. I manage a whole project team. During Covid I took over 4 other teams and special projects including the development of new products. My supply chain course has come in handy. I love my job and the people I work with. I feel part of a team and enjoy the problem solving. I've had the opportunity to travel. I learn something new every day!

I am part of MBS IAB, where I conduct leadership interviews and mentoring. I hired several people from MBS to work at my company. The courses, networking and career support provided me with this opportunity that I have today. I think of the professors who helped me a lot with my interview and resume and were supportive along the way. It's

hard to ask for help, but I learned if you reach out, there is great benefit and power in networking. MBS gave me my career start."

Supreet Kaur MBS '19

"I am currently an Assistant VP at Morgan Stanley. I build and manage databases to develop strategies. I helped to create an AI product and built a marketing company in the AI space. Prior to going to Rutgers MBS, I worked in the pharmaceutical industry, so graduate school opened my eyes to a whole new career.

I received an undergraduate degree in mathematics in 2016 from a university in India. There with a math degree you are expected to become a computer programmer. At the time, I was considering whether to go to graduate school or get a job, do research or go abroad.

In my quest to answer the question about what to do next, I found programs in the US and Canada that sounded intriguing to me. The Rutgers MBS program was flexible, addressed the whole person and provided a lot of freedom in course selection. This was not something that existed in my country.

The program struck me as professional and practical, not just learning from a textbook but with real-life experiences and the freedom to talk with professors to enhance my skill sets. There were business courses to learn how to communicate with a wider audience and leadership courses to learn a skill rarely taught in school. And a diversity of students from different industry backgrounds, ages, incomes and industries that I found exciting.

Once I started attending the MBS program, I was frequently the youngest person in many of my classes, half of the class would be senior level executives! This was a bonus because I would learn a lot from them.

As an extroverted person, I took advantage of the numerous events and networking opportunities to learn as much as I could. They provided me with experiences to ask questions in a safe space and learn the people skills that prepare you for success.

I learned a lot about leadership and what professional experience was needed to assume leadership positions. My internship opportunities taught me how to take feedback, navigate various situations and not feel as lost. I adopted a learning mindset and learned how to hustle, work hard and study on my own. My internship experience helped me get my first job and shaped my career journey.

I would say that when I started the program, I was naïve, having not worked before and I was in a new culture, 8,000miles from home. Today I am a stronger, better leader, a visionary person, who today could take on more challenges. I can do any job. I have the confidence to be in the big league. In so many ways, this was not a typical Master's program. It changed my thinking. It helped me carve my own path."

Vishala M. Patel MBS '17

"I received my undergraduate degree from Florida University in biochemistry. My job right out of college was as a high school AP chemistry teacher for honors students. I taught Juniors and Seniors and also helped them with their career and college path. I remember telling my students that getting a job in a STEM field was good, but the money was in business, but you can do both.

After giving that advice to my students, I decided to look into practicing what I preached. I loved Chemistry. In thinking about a graduate school focus with business application in chemistry, the two things I came up with were personal favorites: food and cosmetics. Rutgers MBS had a program in both, so I left Florida for New Jersey!

In my first year, I took a formulations class and met a perfumer. I remember thinking, 'Oh my gosh, this is what people can do?' I had so many questions for the lecturer and I asked all of them after class. From that point on I was obsessed with fragrances. So much so, that fragrances became my career focus!

It turned out the New Jersey is the hub of fragrances. In the beginning I applied to any position that would give me exposure to fragrances from being a lab tech to marketing.

I was finally admitted to the training program at International Flavors and Fragrances (IFF) and worked with the scent design managers in perfume. But in order to get that job, I had to apply along with eight other experienced people, and I figured my chances were slim. When I was the one hired, I asked, 'Why did you pick me?' And they said, they were fascinated with what I was doing at Rutgers. That I had a technical background with research and development experience in combination with business training. This was unique. And that my prior training as a teacher meant that I knew how to communicate with people.

I had been with IFF for 5 years when another firm came calling who wanted me to lead the product incubation department. This would give me the opportunity to work with founders, retailers and lead new product ideation. It was a fragrance house, which I loved, and I would have opportunities to work with more products, given how fragrances are such an important part of so many products: shampoos, body wash, etc.

I would be able to use my knowledge, prior experiences and innovation training to enhance all kinds of products that used fragrances, i.e., sun care, moisturizers, hair products, etc. I am constantly learning so that I can strengthen my ideas.

My work has been so successful, that the company has now built a department around my skill set of developing fragrances. They want me to think innovatively. They want me to lead a team of people to do this.

While I am not generally a shy person, I wasn't always the one to participate. Sometimes I felt intimidated by others who I thought had more experience. I felt I didn't have much to share, particularly in graduate school, because I was a teacher. But the faculty at MBS pointed out that my job as a teacher provided me with valuable transferable skills, i.e.,

people management and conflict management things, I didn't realize initially would have value until it was pointed out.

In learning leadership, I came to understand how to build my brand so that I could talk confidently to others about my strengths and contributions. I learned how to channel my energy for effective use. I learned how to be relatable in conversation to a wide variety of individuals that I would meet throughout my business dealings. I learned how to share my story which is an interesting and exciting one and how to be a good listener and to appreciate everyone's skill set. Learning how to communicate more effectively would be a valuable return-on-investment from this program.

My leadership training taught me the value of 'staying in your lane' which is my fragrance lane. But this doesn't mean being static. Quite the contrary. I've learned that you must be continually evolving and learning what people want by being open to what's happening around you. I realized there is always more to learn. MBS taught me to be open to work, you never will know it all."

Today, Vishala is the Senior Fragrance Development Manager at Maesa.

D.S., MBS '28

D.S. entered the Professional Science Master's program in the Fall of 2022, pursuing a Drug and Discovery Development concentration. "This course really changed my mindset about leadership. In, the beginning, when I thought about leadership, I thought, okay, I'm not the kind of person who can do that."

She described herself as introverted and quiet, while leaders are typically characterized as energetic and talkative. "But with all the guest speakers and journal prompts, it really got me to see leadership in a different view. Now I'm thinking, 'Maybe I can do this.'"

D.S. set a goal for herself: to step outside of her comfort zone. And this course provided her ample opportunities to do so. Stinson was required to interview three leaders for an assignment. After browsing online to find New Jersey business leaders, she discovered the New Jersey Small Business Development Center. She chose to interview Kelly Brozyna, CEO-State Director.

"In that interview, [Brozyna] talked about attending women's empowerment groups and meetings. So that was something I kept in the back of my mind. A few days after our interview, she posted this 'Go-GetHer' event on LinkedIn. The title of this women's empowerment summit is a play on the phrase go-getter, catering to women who own small businesses."

She immediately registered. On May 2nd, D.S. traveled to Fairleigh Dickinson University for the event. Priscilla Loomis, Olympian and entrepreneur, delivered the keynote speech. "She was electric. She was so inspiring."

Near the beginning of Loomis' talk, she asked for a volunteer. "There were a few seconds of silence, and then I just put my hand up."

D.S. went up on stage and answered several questions from Loomis. She was rewarded with her choice of makeup items from a nearby table. "I got out of my comfort zone, and it wasn't that bad. In that moment, I didn't think of anything else. It was scary, but I was doing it!"

At the event, D.S. even had the chance to meet Brozyna herself in person. This was her first professional conference. Go-GetHer featured an interactive environment, including spaces to talk about self-care, goals, work-life balance, and plans for the future. "The main message from Priscilla was to stand up for yourself and everything you do every day. After taking Principles of Communication and Leadership and now going to the summit, it solidified the fact that you have to stand up for yourself. You can't be afraid to try new things."

D.S. said this class has inspired her to push herself outside her comfort zone now, especially professionally. She recently volunteered to join a coordinated facility audit team at her workplace. "If it makes me uncomfortable, I have to do it. Get comfortable with being uncomfortable."

As for her goal? D.S. believes she has absolutely achieved it, stepping outside of her comfort zone. "Once you talk to people, they're happy to share their stories. That makes me less afraid to approach people. People like talking about themselves, and it's always nice to learn something new about someone."

D.S. is optimistic about the future. After her experience in Principles of Communication and Leadership, she is excited to find out what she will learn in other MBS courses. She sees courses as an opportunity for her own professional growth and development. "I really want to use my knowledge in this program to help me better understand how to navigate the business side of things. I want to be able to apply [this knowledge] professionally." ²

Leadership and random acts of kindness

Professor Cashman-Walter, instructor of the Communication and Leadership course, created a unique class exercise for taking the leadership characteristic of kindness into the world.

Students were given an assignment to perform five acts of kindness to correspond with the national "Random Acts of Kindness Day." The rules for engagement were simple and not too onerous: do something that would help others, not so easy like opening a door that you would ordinarily do already, but something thoughtful and meaningful. Several weeks later, students returned to report their activities, which included everything from buying a cup of coffee for someone in need to setting up a blood drive.

Professor Cashman-Walter created a story about the wonderful experiences students engaged in what they learned and how this applied to leadership. This story was noticed by Rutgers University Communications and Marketing and featured in "Rutgers Today"! The University also produced a video highlighting the course and assignment.

Surprisingly, shortly after the story was published in Rutgers Today, Professor Cashman-Walter received an email invitation to speak with the chief operating officer of a major national organization who was inspired and impressed with this story and wanted to learn more!

This is what you hope for: that your philosophy and acts of kindness will be noticed by others and that kindness will ripple outwards...where a single action moves through the world to affect numerous others, even society.

What other students say about leadership impact.

Below are quotes from students from the course that show the benefits of learning leadership skills.

"Leadership and Communication, requires all students to engage in deep, incisive introspection in order to establish one's personal and professional goals. This introspection is guided and complemented by an array of personality assessments and actively complied into dynamic document appropriately deemed Leadership Development Plan. My personal introspection began with first selecting my most desired career title within the industry and then constructing a development plan that would serve as a metaphorical roadmap. As an individual that always has had a professional plan – and the decade's old journals to prove it – I was grateful for the opportunity to build my Leadership Development Plan under the guidance and direction of my professor. Not only did this dynamic document serve as a roadmap, but ultimately provided the creator with the tools to create a clearer, more concise path to take to reach my goals." (M.L., Personal Care)

"I learned a great deal in this class and developed a passion and interest in what makes a great leader and the different facets of authentic leadership that has impacted me both professionally and personally. In applying the concepts and lessons learned from the course, I have seen the positive impact it has had in my career and management skills. I would recommend this class to any students interested in growing into good leaders in their organizations. Real life experiences are brought into the classroom and that makes the class enjoyable with a teaching method similar to the case method approach employed at most top MBA programs." (N.A.Ch., Chemical Engineering)

"Throughout my career, I have drawn on the knowledge I gained in Principles of Communication and Leadership. The course taught me how to be a better leader and has helped my career take an upward trajectory from technical analysis to project management and eventually into management positions." (J.C., 2014, Statistics)

"What it means to be a leader in today's workforce and the difference between a "manager" and a "leader" are discussed. Being a leader does not give you the right to force your ideas and ignore the input of others. Being a leader and having people want to follow you requires you to build and cultivate those skills over time. Gain people's respect and trust, listen to what others have to say, and being authentic pave the way for being a great leader. Being leader is not just a title HR gives you one day and then everyone just follows you, its earned. This course has taught me the essential skills for success in my other classes but in the workforce as well. I am mindful and practice these skills every day." (A.P., Drug Discovery and Development)

Communication is an important leadership skill.

As the previous quotes demonstrate, an important component of leadership is being able to communicate effectively and efficiently. Strong communication skills create confidence, clarity, and persuasive messaging, which are core tenets of the Principles of Communication and Leadership course. Students have a lot to say about the importance of this course and skill set...

"The Communication and Leadership course was one of the most influential of the MBS program. In the Communication & Leadership class you are taught the 'how,' 'what,' and 'why' of communication and how that makes you a great leader. No matter what your role is with a company, from entry-level to senior management, communication and the ability to get your message and ideas across are essential to success. In both the written and verbal form, communication is what is recognized first, opinions are formed and are what can set you apart from your peers. You can be the most brilliant at what you do, but if you cannot communicate your ideas in a thoughtful and productive manner, it does not matter...The course taught me how to communicate more effectively and develop my leadership skills. As scientists we are often too focused on developing new technologies, but we also have to be able to sell ourselves to people who might not be scientists and this course helped prepare me for that." (S.K., MBS '12, Food Science)

"I started out wanting to be a cosmetic chemist but realized that with the MBS degree, I don't have to limit myself to the lab. The program gave me a strong foundation in cosmetic chemistry but also prepared me to work in sales and marketing in the cosmetic industry. The communications course helped me feel confident and communicate myself better. Because of the supportive staff and faculty at the MBS program, I was able to network with industry professionals, which really helped me understand the industry." (J.Y., MBS '19, Personal Care Science)

"I had a full circle moment today—I'm leaving Coty for a senior liaison position at L'Oreal and was speaking with my current director who told me that my ability to communicate technical information to all kinds of audiences was a rare and strong skill for scientists to have and that's probably why I was sought out at L'Oreal for that position. I had a total flashback to speaking with my Communications and Leadership professor about how I specifically felt like I struggled with that and wanted to improve, so it made me happy to get that feedback today." (C.T., Personal Care Science)

Networking, colloquia, and events build communication and leadership skills.

Networking, colloquia, and events are part of the three-legged stool of MBS offerings: academics (science and business courses), experiential learning (in the classroom, Capstone, externships/internships) and networking (getting out to meet other colleagues and industry professionals). It is to your advantage to fully engage with each of these activities and integrate them together. Advisors, executive coaches, faculty, and staff are available to help you do this, so you are not alone.

The "added value" of these experiences is to extend them beyond the classroom into the real world. Networking, attending events, and colloquia are ways of increasing your academic knowledge base (through panels and presentations), meeting other people (both colleagues and industry professionals), and enhancing your professional development skills (technical and people-related skill sets). Participating in these opportunities is reinforced by the faculty and staff and the best part is, they are selected by you!

These offerings provide that extra special something that allows the program to have an impact and help the entrepreneurially minded, self-directed students achieve or even exceed the goals they set when they entered the program. These offerings allow you to figure out how to build your brand by learning from leaders on how and what you need to acquire the job or position you are seeking and get a seat at the table.

Encouraging networking.

Networking is an integral part of the MBS experience and is the key to many of the goals students have in pursuing a master's degree (promotion, finding new opportunities, higher pay, etc.). The MBS promotes networking through many different avenues. All courses in the program have a "professional/experiential" component, where professionals in the field are invited to guest lecture.

Many times, multiple speakers are invited to give panel discussions, and these discussions are opened up to all students in the program (as colloquia events). All students have to attend at least 12 of these colloquia events outside of classes. The MBS degree program also runs other general invited lectures, but these are all professionally based and given by industry personnel. General networking events with alumni and industry professionals are also arranged both in person and online ("virtual Friday series" are online alumni-student networking opportunities). Various companies participate in these offerings, and both in-person and online students are encouraged to attend. And yes, we allow students to use the holiday party as part of their 12 colloquia count.

1. **Colloquium** speakers are selected by faculty members, so they provide additional learning, thus supplementing the coursework. The goal is to expose students to contemporary scientific and business-related topics. It is a supplement to and meant to complement the students' coursework to make students aware of current issues, developments, and events that are going on in their respective disciplines and within the business community in general. Colloquium events can be either MBS-sponsored events or events related to science, technology, or business sponsored by other organizations

- (e.g., Professional Society, Scientific Meeting, Corporate Conference, another educational institution, or another unit at Rutgers).
2. **Networking** provides opportunities, in a more purposeful way, for students to meet those in the industry to ask questions and learn more, which could begin their own pathway to job exploration. The first opportunity for students to professionally network is our course in Communication & Leadership. This course allows students to interview leaders in their field. It provides numerous opportunities for students to grow their networks, including several in-person meet and greets.
 3. **Events or workshops** provide another opportunity to help students develop professionally. The events are sometimes offered in a more relaxed setting in the form of "recreational mixers" where students, alumni, staff, and guest speakers get to socialize over dinner in a casual atmosphere.

Students enthusiastically endorse these offerings and the numerous ways in which they offer short and long-term benefits.

*"Because of the Rutgers Master of Business and Science program, I understood the value of **networking effectively**. The unique partnership between the program and NYSCC gave me access to meet professionals from my field and helped me land my current position. The MBS program helped me develop the skills I needed to navigate my career in this highly competitive industry."*

*"The MBS program really helped me leverage my skills as a project manager into IT/cybersecurity. I was able to learn about the industry, **network effectively** and landed my current position through the program."*

*"Thank you to the MBS program, I am now working at my DREAM JOB. If it weren't for the connections and **networking** that occurred throughout the years in my classes, and the motivational support from my classes and professors, I would not be where I am today. I cannot recommend this program enough for young professionals who aspire to be in the beauty/ cosmetics industry."*

*"I am now much more comfortable and confident about how to act and react in a business environment especially on interviews, lunch-in and running a meeting, **networking**. The MBS program gave me access to a concentrated group of professionals and numerous opportunities to make connections with people working in spaces that interest me."*

*"The best part was during the program period that not only involved the subject matter but also gave me a chance to attend various **seminars** which included people from different industries both in food science and business for which **networking** was possible. I was also able to develop some strong relations with the other graduate students from the department whom I share similar goals and interests through many **networking events** the program has conducted. I am extremely thankful and glad for the opportunity and knowledge I was able to gain through the program."*

"The MBS program actually gave me more than I expected to get from a master's degree. It provided me with the opportunity to work with classmates and professors with the

*diversified background, broaden my horizon with **well-designed events and lectures**, improve my communication and leading skills and get experience from working on various projects."*

*"My journey throughout the Business and Science program has been immensely insightful and empowering. It has given me an opportunity for multifaceted growth, where the Science courses helped me refine and augment my technical skills, the Business courses helped me capitalize on my business acumen which in the current day scenario plays a very crucial role in professional success. All along the journey, I got to meet and work with immensely knowledgeable professors, great researchers and also learn & work hand-in-hand with industry experts. In addition to the coursework, the **distinguished colloquium** series was a great experience, where students get a chance to be part of invaluable industry veteran talks, knowledge transfer sessions and workshops. Nevertheless, I'm thankful for the skills and confidence that the MBS program gave me, and I'm happy to say this without a question in mind that the program has been instrumental in guiding me through the quest to carve a definite innovative path to my career."*

As alluded to in these student quotes, searching for a job begins long before your graduation. Building networks, participating in colloquia, and attending events will contribute in an invaluable way to your resume, interviewing, and finding your best-fit job or advancement opportunity.

While students are busy and at the time may not see the value in these offerings, so many alumni returned and said, "I didn't understand it at the time, but I now know why the program wanted me to attend the colloquium and networking events. That's where I got the idea for my career, that's where I met people who helped me get the job I have today."

Summary.

The preceding pages describe the numerous inputs for enhancing your communication and leadership skills.

However, the starting point to gaining leadership and communication skills begins with your own self-awareness. Developing great communication and leadership skills starts with you "leading your own ship."

The Plays

How well do you know yourself? What are your strengths, goals, challenges, and opportunities? Start with an exercise that identifies what your personal best looks like.

Play 1: How would you describe your "Personal Best"? Jot down...

1. What are you already doing that you would describe as your personal best? Explain why.
2. What might have made this activity or behavior even better?
3. What projects have you been meaning to do but didn't have time? What would your personal best look like for those projects?
4. How might you demonstrate to those around you a new aspect of your leadership?
5. When might you ask your manager to be involved in something new or become more involved?
6. What is your leadership vision? Explain why that is.
7. What is your personal brand? Explain why that is.

8. Use this exercise to be seen in a different or outstanding way in your resume, cover letter, interviews, and on the job.

Play 2: Leaders You Know.

1. What leaders do you know that you can interview?
2. What makes them seem like leaders? How would you describe their qualities and characteristics?
3. What are their beliefs? What do their beliefs seem to be?
4. How would you describe their actions/behaviors?
5. What thoughts and actions did they deem to be valuable in life and work related to diversity, equity, inclusion, and belonging?

Play 3: What are your thoughts about the need for leadership in STEM?

Why we need more science leaders. There is no dearth of big, important societal problems to solve. We need STEM leaders to innovate and address the small and large issues that baffle and plague our society. Solutions don't just happen without someone or many people leading the charge. There is a cost to society in not training STEM leaders.

Your education as a scientist has been guided to develop your science expertise. Learning about leadership is important because it helps you translate your STEM expertise into successful outcomes by educating, influencing, and leading the business community toward meaningful impact.

Consider these important questions for the future and the role you can play...

1. Why do we need more leaders in science?
2. What does science leadership look like?
3. What are the most important challenges science leaders face?
4. How do science leaders build more efficient and effective organizations?
5. How do science leaders formulate messages, engage key stakeholders, and make a difference?
6. How can we help science leaders transform and innovate in business?
7. How can we grow more science leaders?

PLAYS for Networking, Colloquium and Events

Play 4: Develop a plan for taking advantage of networking, colloquium, and events.

Step One: Sit Up. Looking at the colloquium and networking events, what's your strategy for enhancing your MBS experience? Do your research to get the most benefit. Think about what you would like to gain from these offerings. Make your selections strategically beneficial. Seek advice from colleagues, faculty, staff, executive coaches, advisors, and alumni.

Step Two: Sign Up. Schedule and sign up for what will add to your experience. Don't wait until the last minute. Prioritize this. It might be harder to get behind it because you are not familiar with the outcome or benefit. Take advantage of the wisdom from those who came before you about its value to you. These offerings are part of the three-legged stool for satisfaction/success with this program: academics, experiential learning, and networking.

Step Three: Show Up. Commit fully, i.e., 100%, and dedicate yourself to getting the most out of this experience. It will never be so easily available.

Step Four: Save It. Take notes and keep a "rolodex," i.e., a contact list of all your meetings and key contact information. Find faculty advisors and mentors who will support you, not only while you are a student in the program but are contacts long after you've left the program. They will be valuable resources for questions, recommendations, and references you will need throughout your career.

Play 5: How is your networking going?

Opportunities to build networking contacts take place throughout your MBS experience. Professional societies and organizations are an easy way to get started. Student memberships often provide career information, access to mentors, and a way to become involved with members of the society. Your academic program may feature industry guest speakers, special seminars, and social activities. Meeting employed graduates from your program provides a valuable source of information and advice. Useful contacts are often made outside of your educational environment through family, friends, and casual meetings.

1. Document contacts as you make them and create a list of potential mentors and future contacts for job openings. The key to networking is following up.
2. Are you networking and mentoring to benefit yourself and others?
3. What networking are you doing, and what results are you looking to achieve?

4. What are your obstacles to networking? How can you address those?

5. Are you mentoring others to practice skills needed for your next career option?

6. What experiences did you have that you can use on your resume, interviews or in your job (for your Odyssey 1, 2, and 3 Plans?)

Play 6: Create a list of ideas and behaviors of things that you learned during the Communication and Leadership project that you will be able to use in your resume, interviews, and on the job. (Think about these items as they apply to your Odyssey 1, 2, and 3 Plans).

CHAPTER 7: NOTES

Thanks to those who were interviewed or provided quotes or content for this chapter: Kathleen Cashman-Walter, Abbe Rosenthal, Caroline Thorpe, Julianna Rossano, Christopher Smith, Ashley Kark, Supreet Kauer, Vishala Patel, Ahn Tran, Dayani Stinson, Morgan Lambert, Ngumbah Aneh Chumbow, James Curcio, Amelia Perry, Simkie Kar, Jiayi Yuan, Ridhi Tatineni, Camille Tachelle, Robert Warfsman.

1. *Christopher Smith, Drug Discovery & Development, MBS '25, Guest Post, "Student Voices: Key Insights from Principles of Communication and Leadership," Rutgers University Professional Science Master's Program, Master of Business and Science Degree blog post, March 17, 2023, <https://mbs.rutgers.edu/article/student-voices-key-insights-principles-communication-and-leadership>.*
2. *Julianna Rossano, "Achieving Your Goals: MBS Student Inspired to Step Outside Her Comfort Zone." Rutgers University Professional Science Master's Program, Master of Business and Science Degree blog post, June 7, 2023, <https://mbs.rutgers.edu/article/achieving-your-goals-mbs-student-inspired-step-outside-her-comfort-zone>.*

Chapter 8

The Capstone Project

Where Entrepreneurship & Intrapreneurship Meet Accomplishing

“The calculus of innovation is really quite simple: Knowledge drives innovation, innovation drives productivity, productivity drives economic growth.” William Brody

The “Capstone” is the final destination for the Rutgers MBS degree which is a comprehensive experience for bringing a science invention to market to whomever controls the resources and for wherever it is needed. The Master of Business and Science Capstone takes the place of a Master of Science thesis. It is meant to be more than a theoretical exercise—a living, breathing team-based exercise that requires you to bring all the learning from the courses, real-world experiences, and networking to create an innovative product, service, or case study that involves science and business.

The exciting “end game” of the MBS degree program is three-fold:

1. Diving deeper into your passion for science and learning how to apply it to business.
2. Receiving an advanced degree, the Master of Business and Science degree in the Professional Science Master’s program.
3. Learning how to become an “intrapreneur” or an “entrepreneur.” “Entrepreneurs” run their own companies. They have complete freedom and responsibility. “Intrapreneurs” are responsible for innovating within an existing organization, usually a big one. There is an appeal for each of these endeavors depending on your individual goals and motivations. For many, being totally in charge, and having the visibility and upside is the goal; for others, innovating within a company has similar rewards.

Characteristics most frequently associated with entrepreneurs and intrapreneurs in science and technology positions are “innovator,” “self-starter,” “creator,” “adaptable,” and “resilient.” This course takes a methodological approach to innovation, teaching students how to research a new venture and break down the “innovation” into a set of doable parts.

The Capstone is the master’s thesis.

As the culmination of the Professional Science Master’s program, the Capstone project combines your prior degrees and graduate-level learning in the technical fields of science and engineering with your desire for management that leads to tech-intensive enterprises. The Capstone project taps into all that you’ve learned in the program.

Because it calls upon all that you've learned in the program, you must take the business and science prerequisites before pursuing the Capstone. Although it does not have to be the final course, you are encouraged to take it toward the later third of your coursework.

The Capstone objectives.

1. Ready to earn professional salaries.
2. Understand general management and managing in science-intensive organizations.
3. Fill gaps in business education.
4. Understand scale of operations from start-ups to mega-global corporations.
5. Can distinguish role of sectors: Private, Public, Not-for-Profit.
6. Understand resource allocation.

The Capstone methods.

1. Cross-training as angel investors, entrepreneurs, and intrapreneurs.
2. Understanding the full innovation cycle, from ideation to global roll-out of new products.
3. Engaging in a big project with VC Pitch & BP feedback.
4. Conducting numerous smaller projects.
5. Experiencing individual and group components.

The Capstone project process.

The Capstone process is an illuminating one. You are asked to go to databases and find three recent discoveries that are not widely commercialized and ones you believe the world needs or if you have your own ideas, you can use those. All the ideas are shown to the class who are then asked to select three ideas they would most like to build a business around. Teams are created based on students interested in the same idea who then build a business with others sharing a passion for the same idea.

What is unique and differentiating about this capstone is the use of teams to build businesses. This project uses, to maximum effect, a team structure to achieve a business outcome under a very tight timeline, not unlike what would be experienced in a real work-related situation.

Your team spends the next nine weeks developing a full business plan for this product or service, including mission, vision, and values. Your goal and challenge are to answer all the key questions needed to make your business viable: what problem are you solving, who is the target audience, how will you run your organization, what is your process for development and distribution, how will you raise capital to launch, and how will you be financially sustainable over the next five years...using real-world materials and services, so not hypotheticals.

Having engaged in this creation and innovation process, you are then asked to present your ideas to angel investors for realistic feedback. You will be asked to respond to questions about ...Is

there readiness to go forward? Have you reached satisfying standards? Would there be investor interest?

Some Capstone projects.

Here are some of the innovative businesses that students developed this year. Please note the range of ideas!

1. A seaweed bioplastics company producing sustainable personal care packaging.
2. A clothing company connecting creatives with individuals to reimagine their wardrobe.
3. A liquid pimple patch that heals acne wounds and prevents infection for all skin types.
4. A saddle technology that enhances performance and is comfortable for avid bike riders.
5. The first of its kind, premium, plant-based deli meat that improves flavor & texture.
6. A company that fuses cosmetics and skincare with a unique cosmetic composition.
7. A company that trains cybersecurity professionals for simulated cyber-attack scenarios.
8. A seaweed-based bio-package company starting with non-pack produce bags.
9. Transdermal relief cream with patented CBD/THC polymer complex for systemic effects and sustained treatment of chronic pain and inflammation.
10. An innovative dosage form that improves animal health by providing a pain management solution that is easy to administer and long-lasting.
11. A safe, happy, and healthy indoor environment using a mounted air purifier unit.
12. A product that promotes natural vitamin D production with adequate sun protection.
13. A platform that uses AI and 3D to optimize fit for e-commerce buyers and retailers.
14. A medical device innovator bringing biotechnological advances to the marketplace.
15. Fresh vegetables using a high-end, smart, indoor growing cabinet.
16. Home-cooked meals brought to disaster relief families who have lost their homes.
17. A product that provides a healthy alternative for promoting gut health.
18. A product with Manuka honey's healing powers to provide modern medical solutions.
19. A product that contains IOT technology to track a building's unique energy data.

What allows the students to build these businesses?

Your MBS graduate science training teaches you to explore new knowledge beyond the known boundaries of learning, redefine significant chunks of human knowledge, and then organize experiences in the unknown. In the MBS degree program, you can pursue over 20 technology concentrations including data analytics, drug discovery, user experience design, food science, personal care, biotech and genomics, engineering management, cybersecurity, and sustainability.

Additional parts of the capstone include “real” activities that would be necessary in the development of these ventures, for example, calling actual suppliers for needed materials. You must consider a range of topics based on your business and science expertise to understand your product or service's impact on sustainability, value creation, market niches, recruitment, and retention. The product or service development is supplemented by field trips to Innovation Centers and non-profits and charitable organizations. It should be obvious that these Capstone

projects have broad-based appeal, considerably larger than what a traditional Master of Science master's thesis would have to a more academic audience. These projects are so interesting, worthwhile, and can benefit a huge segment of the population!

The nine-week course represents about 300 person-hours, and it is one of the most time-intensive courses in the MBS degree program. This is challenging for the team, but smart, resourceful students find ways to create remarkable businesses!

Lessons learned from the Capstone experience in creating a business.

Working with a team to create a business and present it to an investor in nine weeks teaches you a variety of things. Here are a few of the things the students mentioned that are true of real-life entrepreneurial/intrapreneurial projects.

1. Identifying and figuring out how to solve a problem.
2. Consuming content across diverse channels to keep you informed of the marketplace and to know how to reach your target audience.
3. Building a diverse skill set.
4. Learning to lead, communicate, and manage other people.
5. Time management skills.
6. Networking.
7. Financing the business.

One of the most interesting aspects of the Capstone course is its lasting impact. Alumni are routinely surveyed and rank the Capstone as one of the most impactful classes in the MBS degree.

Here are some overall student takeaways from this experience reflecting the instructor's expertise and commitment to making this a worthy end goal and master's thesis exercise.

“The capstone experience is grueling. It's hard. It's stressful. It is the culmination of all your long rigorous nights of studying and preparation. All that being said, I wouldn't change it for anything. It quite literally brought everything together for me. At the end of it all, I realized that I had the confidence, and most importantly the knowledge, to not only be in the room but add value to conversations that I probably otherwise would not have been privy to. The MBS program has supported my career growth by allowing me to tap into a unique and unrivaled resource, the MBS family. Whether it is through social media or other outlets of communication, the MBS alumni and staff are unlike any resource that you have ever had access to.” M.E.L., MBS '20, Drug Discovery and Development,

“This program has taught me a great deal in the pharmaceutical world. Each professor has challenged me to do my best and to become a better leader and team player. These classes are like no other I've taken before, especially the Capstone class. The professor is tough, but he is tough so that we are prepared for business and the work that comes with it. This class has taught me what it takes to create my own start-up company and the amount of work and time it takes. I always thought I was a great team player, but this

class has taught me that there's always room for improvement and more to learn from each other. I'm very glad I decided to enroll in this program and show others what I am capable of." V.M., MBS '19 Drug Discovery & Development

"I thoroughly enjoyed my capstone experience; it not only allowed the integration of knowledge gained through the many courses and conversations I've had with my professors and peers but more importantly, it provided the experience of networking with and receiving immediate feedback from industry professionals. Pushing myself out of my comfort zone to present the Capstone was even more than I expected—challenging but rewarding, and an exact expectation of my progressing roles in technical management."
K.P., MBS '14, Information Technology

Conditions for entrepreneurship and intrapreneurship?

The MBS degree program is entrepreneurially/intrapreneurially oriented because it trains managers who understand both science and business to blend the known and unknown while testing propositions as they go. This approach provides the conditions for change, evolution, and sometimes, revolutions.

There are, of course, many types of entrepreneurship companies and intrapreneurship ventures: scalable start-ups and small, medium, and large companies. There are many types of entrepreneurs and intrapreneurs: builders, opportunists, innovators, and specialists. Entrepreneurs and intrapreneurs exhibit a variety of characteristics: versatile, resilient, business smart, curious, independent, persuasive, and focused on helping others. These innovative people are vital for the economy as is discussed widely in the literature on the value of entrepreneurs and intrapreneurs. We share some thoughts from Investopedia by Adam Hayes and the Indeed Editorial Team below.¹

How and why are entrepreneurs important for the economy?

In 2023, there were 33.2 million small businesses in the United States. There are a variety of ways in which entrepreneurs help the economy. They:

1. Create new businesses by inventing new goods and services that create new jobs both for themselves and others.
2. Innovate for organizations to produce revenue that improves the quality of life through ideas and technology.
3. Help enhance the standard of living by meeting customer demands.
4. Support research and development of products through the testing that leads to new products and services.
5. Increase productivity through competitive pricing causing others to rethink strategies, increase the equality of products and efficiencies.
6. Add to the national wealth by adding to the gross national income.
7. Create social change by breaking conventions and inventions

8. Invest in community projects and contribute to social welfare that bring about reforms that help people in society.¹

The Capstone project is your exciting, entrepreneurial/intrapreneurial beginning!

Here is an excellent example of how the MBS degree program created a new business fueled by the Capstone!

Ashley Rae Kark, MBS '10

Ashley's journey to her position as CEO of BIOjump is a fascinating and interesting one. It started with her degree from Montclair State University, where she knew that she liked science, and with an open mind, she explored chemistry, marine biology, and microbiology. Microbiology was the one she enjoyed most, and she pursued it for her degree. She envisioned that she would look for jobs in labs at companies or hospitals when she graduated.

After graduating, she was looking at Craigslist and found a position with a German company that sounded interesting to her. She interviewed for the position and the owner thought she might be better in sales than working in the lab as a lab technician. She turned down his offer, but a few days later, he called her back and asked her to try the sales position and if she didn't like it, after three months, he would move her to the lab. She loved this position and never looked back!

Her position with this company was "a life-changing experience." At the time, she didn't even know that something like this existed. She was excited to realize that she was speaking with "Ph.D.s with 50 years of experience in cell biology and had the opportunity to travel all over the world: from Boston, to Japan, Southeast Asia, and Europe. I was told that after a while that travel would get old, but I love it! Thinking back on it, how did I ever think that I would love working only in the lab!"

While Ashley was very satisfied with her responsibilities, she felt somewhat unprepared in her conversations with clients related to industry terms, skill sets, how organizations are structured—all things that would allow her to better communicate and understand them.

It was at that point that she started looking at MBA programs and found the Rutgers MBS degree program, partly because she lived in Princeton at the time. She saw that it had a Drug Discovery and Development track, which was a perfect fit for her interests and job responsibilities. She showed the program to her boss, and he agreed to pay for her education.

She was working full-time and initially only had time to take a few classes. Dr. Silver was asking for input. Ashley, along with others who were working and trying to take classes in person, asked for more flexibility so they could do both. The MBS accommodated by providing online courses so that over time, Ashley was able to work full-time and take the classes full-time.

Ashley recalls many of the classes she took. Pharma/pre-clinical was one of her first classes. Other students new to this area might have found it difficult, but she really enjoyed it because it was an extension of her professional work. Advanced cell biology and clinical statistics were others she really enjoyed. She loved the business classes and even found time to supplement the business courses with others, e.g., in social media, which in 2010 had just started to take off.

All the classes were extremely useful to this self-described “young female in a senior role at her company.”

Her “pivoting point was the capstone.” She was paired with a postdoc who had her own IP. The team developed a business plan which perhaps motivated them even more, since they were really looking to launch this product. Ashley valued the work with Dr. Tom Bryant and the experience offered in the course.

After receiving her MBS degree, the company she had been working for sold to a larger company. Ashley decided to stay on with this larger company but, after a while, found that her preference was more for the entrepreneurial mindset of smaller companies than the bureaucratic orientation of larger ones. She consulted with Dr. Bryant, who had been so instrumental in her Capstone, and he connected her with an individual who would help her think about a small company of her own.

At about the same time, she reached out to her previous employer and found out that he was looking to start a new business, too. She had always valued his mentorship and so in 2015, the two of them started BIOjump. It had only been five years since she started her first job and received her MBS degree.

BIOjump is a logistics company whose clients are international companies that need to provide services to their US-based customers or new markets. Those services include local office representation, warehousing and order processing, and business development and marketing services. BIOjump focuses on the preclinical life science industry, enabling and utilizing a well-developed network of opinion leaders in the pharma and biotech industries. They have facilities in New Jersey and Germany and are familiar with both the European and the US market common practices, laws, and regulations and are always in direct contact with its customers. BIOjump fills the gaps created by the steep learning curve, and the financial risks of building a US/European subsidiary can be a big hurdle that prevents many companies from making that critical first step to working in a transatlantic market.

Over a short period of time, the company has grown from different locations and buildings in East Brunswick, then Hillsborough, and Hamburg, Germany. Initially, Ashley did everything herself, i.e., the ordering, shipping, and operations, but now has a staff of seven, four in New Jersey and three in Europe.

As the CEO of BIOjump, having launched and grown this company, when asked about her thoughts on leadership, in her very humble but believable way, she shared the following characteristics that have been a part of her life philosophy and practice:

1. Be open to opportunities and then take the initiative to do something. When the opportunities arise, don't be afraid to get a mentor, someone who can teach you the skills you need, both technical and business, but also lives in a way that fits your style. For example, she found that working with European companies, they are a lot more understanding about the needs of life, in general. Be understanding that life happens.
2. Hire good people, team-oriented people, and create a teamwork culture. Your employees must also feel that they can speak their minds. Many of my employees have "strong personalities." Don't be afraid to be intuitive and go with your instincts.
3. Be fair, particularly to your employees. Listen to what they are saying and try to understand from their perspective how to help set them up for success. Sometimes this means helping address their personal needs. Be flexible.
4. It's important that the focus of the CEO not just be about making work but understanding the problem you are trying to solve. Be able to communicate and get everyone working in the same direction. Once you have your direction, be decisive and provide the effort and hard work to make things happen.
5. Be proactive, not reactive. This means being strategic, a planner, understanding your marketplace now and in the future, resourceful, resilient, be customer-focused and have a "can do" mindset. "My gears are always turning."
6. Personally, take time to pursue things of interest to you. Fuel your passions.
7. Keep people happy.

Ashley mentioned that she could not have imagined how different things might have been if she had taken a more theoretically oriented MBA program rather than the MBS experiential program that has been so instrumental to her leadership development.

Since graduating with an MBS degree, Ashley has been on the Rutgers MBS Industrial Advisory Board (IAB), providing internship and externship opportunities to MBS students.

Asked about the importance of "lifelong learning," she said, "You are always growing, and you need information to grow. So, you need to always be learning. At any point in time, take a step back and look inward. Ask yourself, what is the problem you are trying to solve? Build from that insight."

Summary.

There are many benefits associated with the Capstone project. This equivalent to a master's thesis causes you to bring together all your learning and experiences to date around an innovative idea to become an intrapreneur or entrepreneur. And, most importantly, it has a public defense, where you are required to pitch your project and answer questions.

As in the real world, you will be working with a team of individuals, likely with unrealistic deadlines. You will be asking yourself questions, "What is needed? What have I missed?" In certain instances, you will be responsible for originating ideas, processes, and managing others.

You will be thinking on your own as you seek to present a new company or idea to your investors or management at your company. You must be able to focus and filter and persuade while being open to new ideas. All these are challenging, but that is what will make this an invaluable experience.

The Plays

Play 1: Develop the mindset of an innovator. Please look at these 10 statements and rate each based on how much each one fits your outlook. Please use a scale of 1-10, where 1=Not at all agree, 5=Neutral, 10=Agree very much with how much this describes me.

1. “The value of an idea lies in the using of it.” (Thomas Edison)
2. “Innovation is the unrelenting drive to break the status quo and develop anew where few have dared to go.” (Kensi Gouden and Steven Jeffes)
3. “The world needs dreamers and the world needs doers. But above all what the world needs most are dreamers that do.” (Sarah Ban Breathnach)
4. “The secret of change is to focus all your energy, not on fighting the old, but building on the new.” (Socrates)
5. “When the winds of change blow, some people build walls, but I build windmills.” (Chinese proverb)
6. “I skate to where the puck is going, not to where it has been.” (Wayne Gretsky)
7. “Most innovation involves doing things we do every day a little bit better rather than creating something completely new and different.” (Darin Bifani)
8. “I’m not afraid to take big steps when one is indicated. You can’t cross a chasm in two small jumps.” (David Lloyd George)
9. “What good is an idea if it remains an idea? Try. Experiment. Fail. Try again. Change the world.” (Simon Sinek)
10. “The way to get good ideas is to get lots of ideas and throw the bad ones away.” (Linus Pauling)

After you’ve rated each of these statements, look at the top 5 and think about the kind of Innovator characteristics you have. Are there any statements in the lower 5, that represent perspectives you would like to adopt? How might you go about doing that?

Play 2: Create a list of ideas and behaviors of technical skills and business/transferable skills that you learned during the Capstone project that you will be able to use in your resume, interviews and on the job. (Think about these items as they apply to your Odyssey 1, 2, and 3 Plans.)

1. What technical and business/transferable skill sets did you practice? Provide detail.

2. Provide a comprehensive description of relevant, important insights you gained from the Capstone project as they apply to your Odyssey 1, 2, 3 Plans.

3. How did each of these experiences help you achieve your overall goal and your Odyssey 1, 2, 3 Plan goals?

CHAPTER 8: NOTES

Thanks to those who were interviewed or quoted for content in this chapter: Tom Bryant, Abbe Rosenthal, Ashley Kark, Manuel Enrique Lopez, Vanessa Murano, Keshia Paulino, Jim Andahazy, Jim Curcio, Trisha Sookraj.

1. Adam Hayes, “Entrepreneurs: What It Means to Be One and How to Get Started,” *Investopedia*, Updated July 29, 2024, <https://www.investopedia.com/terms/e/entrepreneur.asp>; Indeed Editorial Team, “The Importance of Entrepreneurship: Features and Types,” *Indeed*, updated June 27, 2024, <https://in.indeed.com/career-advice/career-development/importance-of-entrepreneurship>.

Chapter 9

Your MBS IDP Playbook

Where the IDP Meets Your Career Goals

“If you don’t know where you’re going, you’ll end up someplace else.” Yogi Berra

One of the primary goals for pursuing this degree is to grow.

Grow your scientific and business learning.

Grow your network of colleagues, advisors, and mentors.

Grow in taking the next step in your career.

Grow your satisfaction in life.

Students come to the MBS degree with a variety of job experiences, career goals, and aspirations. Those aspirations may include looking to rise to a higher level in your organization or change companies but stay in the same industry. You may be looking to switch to another industry, start your own company, or continue your education while exploring other careers. Whatever the aspiration, we will be looking to help you progress toward it.

By this point, we hope you have seen that the MBS degree program is student-centered and recognizes all these individual differences. It encourages you to create your own program to achieve the goals you set before yourself, whatever those goals may be.

Everything you’ve read so far about the program should convince you that the MBS degree program has as its goals, your goals, i.e., helping you to advance in your career and life. To do so, the program created “plays” and a “practice field” with a variety of coaches and tools to help you “complete a successful season and successful life.”

A lifelong learning mindset will carry you through your MBS degree and beyond.

The other point we hope we’ve made thus far is the interest and importance we have in helping you develop a lifelong learning mindset.

“We now accept the fact that learning is a lifelong process of keeping abreast of change. And the most pressing task is to teach people how to learn.” Peter Drucker

Change is inevitable. The ability to respond to change yields success.

Acquiring knowledge along the way facilitates your ability to respond to a changing business, scientific, and technological environment. Staying current enables one to respond to change as opposed to reacting to it.

This philosophy of constantly acquiring knowledge is referred to as a **lifelong learning mindset**. The MBS degree program values this concept so much that it spends a great deal of effort inspiring a lifelong learning mindset in its students. Through its science and business curriculum, **you will learn how to learn** so that when you leave, a lifelong learning mindset will serve you well throughout your career and life.

As we described in Chapter One, this MBS degree program's curriculum goes beyond that of a traditional master's degree. It incorporates "differentiators" that set the foundation for and strengthen this lifelong learning mindset. These "differentiators" prepare you to respond to, as opposed to reacting to, change, making you better able to continuously strive toward your career aspirations.

Examples of "differentiators" include:

- Revamping the communication and leadership course to convey the skills you will need throughout your career.
- Providing executive coaches to help you navigate the challenges you will encounter.
- Requiring colloquia and integrating these into classes.
- Encouraging networking.
- Learning how to choose courses and electives to enhance either your current expertise or develop new ones.
- Teaching you why and how to apply these experiences in different and future contexts to further your career and life aspirations.

The MBS degree program is as much about developing a lifelong learning mindset that leads to your growth as it is about progressing through classes and experiences. This mindset ultimately enables you to continue to grow in a changing scientific, technological, business, and professional landscape.

The MBS Playbook is a template to develop this lifelong learning mindset that can be repeated continuously to benefit you throughout your life by helping you track and apply your "knowledge into know-how" learning.

Two important tools are presented to help you plan your career aspirations as an MBS degree student. One, the "Design Your Life" orientation, and two, a formal Individual Development Plan that is typically used at the Doctoral degree level. These "plans" will be shared in the section that follows.

MBS Individual Development Plan (IDP): A Way to Plan Your MBS Experience.

Chapters 4 through 8 describe tools used to build the knowledge and skills to achieve a lifelong learning mindset. Next, we'll introduce the **Individual Development Plan (IDP)**, also referred to as the **MBS Development Playbook (MDP)**.

Your IDP is a place where you can document your goals, list the skills and knowledge that you need to achieve these goals and keep track of your progress toward their attainment. In the spirit of lifelong learning, these tools are also applicable after you complete your MBS degree.

Think of your IDP as a puzzle with all of the puzzle pieces as the skills, knowledge, and tools that are needed to fulfill your career goals. Fitting these pieces together will put you on the road to reaching your goals.



1. Science Curriculum: Experiential Learning
2. Business Skills: Experiential Learning
3. Experiential Learning: Externships, Internships, Professional Lectures
4. Capstone: Innovation, Teamwork, Real World Application
5. Executive Coaching: Leadership & Communication
6. Networking, Colloquia, Events, Relationship Building
7. Academic Advising and Alumni Mentoring: DYL Odessey Plans

The IDP is a way to record all that you are learning, and to organize and integrate these inputs to help you achieve your short-term career goals. But it also represents a “lifelong learning plan” to help you address your long-term career goals and life journey.

From the beginning of the MBS degree program, we used the principles found in “Design Your Life” (DYL) to help you think about your possible career trajectories. This along with coaching, mentoring, and experiential learning opportunities are the foundations to get you thinking about

possibilities. The “Design Your Life” (DYL) thinking is a career/life exploration tool whose learnings are logged into your IDP. A little more about DYL before we return back to working with the IDP.¹

“Design Your Life” (DYL).

At the time of this writing, there has been an unprecedented reevaluation by employees about how they want to live and work. Employees are surveying their current career landscapes with increasing dissatisfaction and are switching jobs, changing career paths, flat-out quitting, or reducing their commitments to the companies where they are employed.

If you count yourself as one who is planning a workplace departure or looking to get more from your current situation, it’s worth asking yourself, *“What do I really want from my career and its impact on my life?”*

In a “world is your oyster” job market for individuals with critical skills, particularly integrated skills that blend tech, science, business, and entrepreneurship, is it really possible to land a job that not only provides ideal work-life balance but that checks every box of your “dream job?”

Absolutely, say executive coaches, who agree that there’s no better time than now to employ a “design thinking-based” or a “**Designing Your Life (DYL)**” program to redefine your life and career goals.

What is DYL?

Formalized by Stanford University’s d.school (and, later, their Life Design Lab), “Designing Your Life” (DYL) teaches you how to apply design thinking to solve what Stanford refers to as “the wicked problem of designing your life and career.”¹

Through DYL, an exploratory tool, **you are able to identify your ideal life and career**, and then, in collaboration with our MBS executive coaches and academic advisors, think about an individualized, goal-driven master’s pathway to support that vision, adjusting course when necessary.

The MBS conversations center around exploring what's next. You are asked to research and bring three jobs you find appealing either because they are the next step or because they have elements of what a next step would require. This approach helps you customize the search process, including your resume, as well as begin to construct your ideal job. Almost always, the conversations turned to life and career.

You are introduced to DYL methodology at orientation so that you can start planning your professional futures with an eye towards career expansion as early as possible in your MBS

education—leveraging both academic offerings and the many professional resources available. A key aspect of DYL is identifying your professional goals through the use of “Odyssey Plans” and making sure you have more than one. It is surprising how many students want to move ahead but are reticent in putting specific job titles on paper. We encourage this to help students choose their electives or even combine concentrations.

At the same time, the MBS faculty and curriculum advisors focus on “Jobs-Skills-Courses,” that is, what jobs are in your view, what skills and experiences are needed to attain these jobs, and then what courses will align in order to give you the knowledge, skills, and experiences that you can apply to gain the job experiences for your resume. This is a dynamic industry-specific academic and career alignment that employs both cutting-edge labor analytics and a diverse body of experts to inform and shape your personalized curricula allowing all classroom learning to remain ever-relevant.

The benefits of DYL integration.

*Life is dynamic and iterative. **DYL-based skills and techniques are portable, equipping you with the strategic thinking skills and tools that allow you to map out fulfilling lives and careers while at MBS and beyond, giving you the ability to easily pivot and chart new paths at any point in the future.***

MBS students and alumni are already well-positioned to succeed in the job market. However, through DYL you have an extra leg up; you’ve not only identified your ideal careers but have mapped out goal-driven paths to attain them.

With clearly defined goals and in-demand skill sets, the instructors say that **“MBS students really can promote themselves into a future they define, one in which they create their ideal position, and achieve a work-life balance that’s ideal for them as well.”**

The MBS DYL approach asks you to explore three levels of career aspirations, two for the near term (Odyssey Plan Level 1 and Odyssey Plan Level 2) and one more aspirational (Odyssey Plan Level 3). The two near-term perspectives are jobs that you will be pursuing right after you receive your degree. The more distant idea might be a job that is currently unexpected or even surprising. It may not be one that would be appropriate for your next job, but one that might make sense in the future as it could build upon a passion you have or attainable with advanced skills that you don’t currently have. All three levels are described in your “Odyssey Plans Levels: 1, 2 and 3.”

Individual Development Plan defined.

The “Individual Development Plan” is a document that provides a comprehensive, evolving reference point for your career journey during your MBS degree program and beyond. The

Individual Development Plan (IDP) is used in many doctoral programs and places of employment as well. (The one used by MBS is based upon the msIDP – www.msIDP.org.)²

Individual Development Plan is recommended for master’s degree students.

The National Academies recommends IDPs for use by master’s degree students. When used properly, it is an effective way for students to explore their career options at the start of their academic journey and then to plan their education so that it complements their ultimate professional goals.

“Graduate students should create an individual development plan that includes the core competencies, as outlined in this report for master’s degrees, as a key feature of their own learning and career goals and that utilizes the resources provided by their university and relevant professional societies.” PP. 97-98 ³

Accordingly, the National Academy defines these criteria for Career Exploration:

1. “Master’s students should be provided opportunities for career exploration during the course of their studies.
2. Faculty, who serve as undergraduate advisors, should discuss with their students whether and how a master’s degree will advance the students’ long-term educational and career goals.
3. Institutions should integrate professional development opportunities, including relevant course offerings and internships, into curriculum design.
4. Master’s students should seek information about potential career paths, talk to employers and mentors in areas of interest, and choose a master’s program optimal for gaining the knowledge and competencies needed to pursue their career interests.
5. Industry, nonprofit, government, and other employers should provide guidance and financial support for relevant course offerings at institutions and provide internships and other forms of professional experiences to students and recent graduates.
6. Professional societies should collaborate with other sectors to create programs that help master’s students make the transition into a variety of careers.”³

In addition to defining Career Exploration, the National Academies project commented on the benefits an Individual Development Plan (IDP) provided to the STEM master’s student:

1. “IDPs will inform students of important aspects of transferable skills and career exploration options and empower them to create their own personalized pathways. They can do this in advance of their graduation.
2. Experience with an IDP acclimates the students to personal development plans/ assessments widely used in the workplace and to ongoing planning, skills, and competencies of the shifting labor market. This awareness creates an understanding of the need for continuous and lifelong learning.
3. Best practices and templates for planning and assessment can help institutions, programs, and employers by prompting discussions and clarification of expectations and

responsibilities in experiential learning opportunities for an increasingly diverse population.”³

The IDP is a way for students to catalog and keep track of everything they have done in classes and everything they have done outside of class. The goal is to help students synthesize all of the knowledge and activity being done as part of the master’s program and to ensure it becomes realized when the students are involved in looking for positions.

The MBS IDP Playbook (MDP).

The Rutgers MBS IDP Playbook is an adapted version of the IDP. It is a career development document designed to empower you to take ownership of your education and career planning. As described above, it will help you reach your academic and professional goals by identifying your academic path and determining the skills and experiential learning you need for your career next steps, whether that is in the near or far term.

Whether your MBS degree program is to help you land your first or new job in your professional career, make a lateral career move, or seek a promotion, regardless of the industry, the MBS IDP Playbook will provide you with a roadmap for how to get there. When it comes to securing your next job, there is no “one-size-fits-all all.” You have agency. You can create your own career path.

There are individual development plans designed for company employees to help you grow the organization. For you to grow, you need your own development plan, and the MBS IDP Playbook allows you to integrate the two (your own and the one for you as an employee) that will propel you and your impact. When you are able to do more as a result of these IDPs, your organization will find you more valuable.

What makes the MBS IDP Playbook unique, as shown in the pages that follow, is that it’s an action-oriented and dynamic roadmap recognizing that speedbumps (aka life events!) may get in the way and that detours are inevitable. It is an iterative and evolving process that you will be encouraged to revisit time and time again.

As you start filling out the MBS IDP Playbook, you are encouraged to explore, assess, and evaluate your choices to determine if you are acquiring the right credentials, learning what you need, and making the right contacts for your particular career path. The MBS IDP Playbook explains why the curriculum and classes are structured as they are so that the pieces fit together, and you benefit as a result.

Benefits of the MBS IDP Playbook.

This MBS IDP Playbook helps you take charge of your career development by having you:

1. Explore your career options.
2. Review your previous work experience and determine how to position its relevance to your future career.
3. Identify skills and competencies essential for your career.
4. Learn to self-assess your skills and knowledge, set goals, and self-evaluate your progress.
5. Provide a timeline to achieve your goals.
6. Understand the requirements of your program and track progress toward graduation.
7. Keep track of experiential learning.
8. Collect information for your resume and interviews.
9. Develop a network of contacts.
10. Increase chances of obtaining a job or promotion in your profession.
11. Be better prepared for workplaces that require an Individual Development Plan.
12. Useful throughout time because you are always evolving your “Odyssey plans” that will help you plan for future situations.

The MBS IDP Playbook.

The MBS IDP Playbook has ten sections, each addressing a core element of individual development planning for you to complete.

The MBS IDP Playbook is an Individual Development Plan tool to empower you, a professional STEM student to identify your academic and career goals and then to create the plan that will put you on a path toward professional success—whether that success is to land your first job, make a lateral career move, seek a promotion, or pivot to a new career entirely.

Each section of the MBS IDP Playbook focuses on an element of your MBS journey. It will walk you through how to fill out the MBS IDP Playbook, emphasize points that are relevant to you as a Rutgers MBS student, and point you to resources to help you along the way.

Important things to consider before you start:

1. Fill out the questions to the best of your ability.
2. There are no right or wrong answers. Everyone's MBS IDP Playbook is unique to them. Your entries are not “written in stone” and can change over the course of time.
3. For it to be effective, you need to revisit your entries at critical points along your journey (e.g., when you are selecting classes, prior to a meeting with your advisor or with an executive coach, etc.) and make changes as needed.
4. You will likely have provided your thoughts on these questions in the “Plays” of the previous chapters.

As you progress towards your MBS degree completion, your MBS IDP Playbook will become filled with the contacts you’ve made, the experiences you gained, the coursework you completed, and the efforts associated with each of these experiences. When used effectively, your Rutgers MBS IDP Playbook will be packed with examples of your accomplishments on graduation day for use in your resumes, interviews, first job, and any thereafter. It will be a “journal” that will be valuable for the rest of your career.

Instructions and Direction:

Get excited to start! Have no fear! Directions on how to create your MBS IDP Playbook are described below.

1. Look for prompts throughout the document that will direct you to the attachment or resources that will help you.
2. Instructions and responses can be given in multiple formats (e.g., written, video, internet links, workshops).

SECTION 1: STUDENT INFORMATION
First Name:
Last Name:
RUID:
Rutgers email:
Concentration:
Academic Advisor:
Advisor email:
Will you be pursuing your MBS degree full-time or part-time? FT PT
Will you be working at a full-time job while you are attending graduate school? Yes No

SECTION 2: MBS DEGREE PROGRESS AT A GLANCE
Semester/Year that you started the MBS degree: Semester / Year
Total Credits earned: (You need 43)
Total Science Credits earned: (You need 24)
Total Business Credits earned: (You need 19)
Total Colloquia attended to date: (You need 12)
Date of last update:
SUBMIT (Submit your MSB IDP Playbook every time you update it. Save a copy for yourself. A copy will be sent to an MBS team member.)

SECTION 3: EDUCATION AND WORK HISTORY
The goal of this section is to gather information about your past education and work history to create your MBS Playbook Plan.
Did you have a break in your education or are you continuing your graduate studies immediately after completing your undergraduate degree? (Select one)
Option 1: Break in education. Yes No
Option 2: Starting the MBS degree program immediately after completing my undergraduate degree. Yes No
If you picked Option 1, how long has it been since you last attended school? ____ years
If you picked Option 2, are you in the 4+1 program? Yes No
Do you have previous professional experience in your chosen discipline/profession, or do you need to acquire this experience concurrent with obtaining the MBS degree? Yes No
(Professional experience is being employed in the industrial and/or corporate sector in a full-time capacity, i.e., 40 hours/week.)
Attach your most recent resume.
Completed: Yes No
Enter the hyperlink to your LinkedIn Profile. If you do not have one, sign up.
Connect with and follow Rutgers MBS on LinkedIn. Completed: Yes. No

SECTION 4: DEFINING THE REASON FOR YOUR RUTGERS MBS JOURNEY. PLEASE ANSWER THE QUESTION, “WHY AM I PURSUING THE MBS DEGREE?”
<p>This is the first step to creating your MBS IDP Playbook. Keeping this question in mind helps you plan your journey and shapes the goals you want to achieve as an MBS student. The answer to the question is also the overall goal for your MBS journey.</p> <p>In addition to indicating the overall reasons why you are pursuing an MBS degree, also list the specific jobs and career aspirations you have in mind for the near term and even farther out. Label your near-term job aspirations as Odyssey Plan 1 and Odyssey Plan 2 and your farther-out job aspirations as Odyssey Plan 3.</p> <p>Useful Resources:</p> <ol style="list-style-type: none"> 1. Use the exercise presented during Orientation "I am--->I want to become" as a thought starter. See Chapter 2, “Play 1” for your Odyssey Plans 1, 2, 3. 2. Attend the DYLworkshop. For more information about “Design Your Life,” See Chapter 9.

3. For more information regarding why you are pursuing an MBS degree, see Chapter 3 and the 3 Plays.
Why are you pursuing an MBS degree?
Odyssey Plan 1: Describe this job, be specific.
Odyssey Plan 2: Describe this job, be specific.
Odyssey Plan 3: Describe this job, be specific.

SECTION 5: DETERMINING THE SKILLS NEEDED TO ACHIEVE THE OVERALL GOAL OF YOUR MBS JOURNEY		
<p>List the important knowledge skills required to achieve the overall goals of your MBS journey. Think about all your Odyssey Plans when considering the technical skills you need. These may come from the job postings you've identified or Other. (See Section 4 responses above)</p> <p>Understanding your program requirements early in matriculation empowers you to plan your academic journey, take detours (if needed), and refine your goals. Do you know what's needed for your advancement/expansion for the jobs you are interested in?</p> <p>Feel free to add more lines. As a resource for Odyssey Plans 1, 2, 3 see Chapter 4 (Play 1), Chapter 5 (Play 1), Chapter 6 (Play 2), Chapter 7 (Play 5, 6), Chapter 8 (Play 2).</p>		
Technical Skills Needed (Industry, Sector, Discipline, Be specific)		
Odyssey Plan 1	Odyssey Plan 2	Odyssey Plan 3
1		
2		
3		
4		
5		
6		
7		
<p>List the important transferable skills required to achieve the overall goals of your MBS journey. These are tools to help you enhance your resume and interviews and be more effective in your job. Think about all your Odyssey Plans when considering the</p>		

transferable skills you need. **Think broadly** about what you will need because these tools are readily available to you in the program.

Feel free to add more lines. See Chapter 5 as a resource and the Play 1.

Transferable Skills (Crosses industries, Sectors, Disciplines)		
Odyssey Plan 1	Odyssey Plan 2	Odyssey Plan 3
1		
2		
3		
4		
5		
6		
7		

SECTION 6: ASSESSING WHERE YOU ARE AND WHERE YOU WANT TO BE

Now, think about where you are starting from for each of the technical and transferable skills you've identified as most important. Rate that starting point on a scale of 1-10 using, 1 = I do not have this skill and need to learn it to 10 = I am very competent in this skill.

Now using the same 1-10 rating scale, rate where you would like to be in that skill when you receive your MBS degree. What does this suggest to you about what you need to do over the course of the program? What do you need to focus on (be specific), who do you need to meet and what do you need to learn to do?

Resources: See Chapters 4, 5, 6, 7, 8 and the Plays in each of these chapters.

Odyssey Plan 1:

Where you are currently (rating) and why.

Where you want to be when you finish your MBS degree (rating) and why.

Technical and Transferable Skills needed and ideas for your progress plan.

Odyssey Plan 2:

Where you are currently (rating) and why.

Where you want to be when you finish your MBS degree (rating) and why.

Technical and Transferable Skills needed and ideas for your progress plan.

Odyssey Plan 3:

Where you are currently (rating) and why.

Where you want to be when you finish your MBS degree (rating) and why.

Technical and Transferable Skills needed and ideas for your progress plan.

SECTION 7: TOOLS TO USE TO ATTAIN THE GOALS YOU DEFINED IN SECTION 6
7.1 Coursework (link to Course Planner)
7.2 Informational Interviews.
Think about how you went about selecting who to interview and what companies, organizations, and departments. Before interviewing, list the unique, real-world experiences the program introduced you to and how those will be important in your interviews or on the job. See Chapters 6, 7, and 8 for networking, colloquia, and events. Use the Plays in these chapters to provide content to support your strategy and approach. Use one line for each interview.
Interview Description and Date (s)
What skills did you practice? (See Section 5)
How did this experience help you achieve your career goals?
7.3 Externship(s). Externship
List the real work situations and challenges you were asked to address. How will you demonstrate those on your resume, in a job interview, as well as when you are on the job? See Chapter 6 for more information. Use the Plays in this Chapter to help you think about how to apply your Externship to your job and real work experiences. You may use one line for each Externship. Externships are recommended for students without relevant professional experience. They are not a requirement for the MBS degree.
Externship (s) Project Title and Date (s)
What skills did you practice? (See Section 5)
How did this experience help you achieve your career goals?
7.4 Internships/Work Experience in Relevant Industry

<p>List the various aspects of this experience that will contribute to your next job and will be useful in your resume and during your interview. See Chapter 6 for more information and the Plays in this chapter to help you think about the application of these experiences. You may use one line for each Internship.</p>
<p>Internship/Work experience title (s) and Dates (s)</p>
<p>What skills did you practice? (See Section 5)</p>
<p>How did this experience help you achieve your career goals?</p>
<p>7.5 Outreach or Service</p> <p>Examples of outreach and service can be taken from class (Communication and Leadership “Random Acts of Kindness”) or the Capstone (your service component) or outside of class. See Chapters 6, 7, and 8 for more information and the Plays in each chapter, e.g., Chapter 6 Play 3 (Volunteering). You may use one line for each Outreach or Service description.</p>
<p>Outreach or Service description (s) and Dates (s)</p>
<p>What skills did you practice? (See Section 5)</p>
<p>How did this experience help you achieve your career goals?</p>
<p>7.6 Colloquia</p> <p>What did you learn and how does it apply to your Odyssey Plan goals? What insights did you gain? How did you or will you turn your thoughts into moving closer to your Odyssey Plan goals? See Chapter 7 for more information and the Plays in this chapter to think about the application of the colloquia experience to further your career goals.</p>
<p>Colloquia Titles (for 12 Colloquia) and Dates</p>

--

What skills did you practice? For each Colloquia. (See Section 5)

--

How did this experience help you achieve your career goals? For each Colloquium.

--

7.7. OTHER

Is there anything else that you experienced that would be helpful in seeking your next job, writing a stronger resume, or conducting a better job interview for any of your Odyssey Plans? You may use one line per additional item being included.

Description (s) and Date (s)

What skills did you practice? (See Section 5)

How did this experience help you achieve your career goals?

SECTION 8: THE CAPSTONE PROJECT

Summarize your Capstone experience, listing the major takeaways and the things you learned that are applicable to your Odyssey Plan goals. Be sure to include the experiences and insights that will be useful in your resume, interviews, and on the job.

Include what you learned about innovation, teamwork, and other technical and transferable skills.

Resources: Read Chapter 8 for more information and the Plays in Chapter 8 to think about the full extension of this learning experience beyond the classroom and presentation experience.

Description of relevant, important insights and skill sets.

What skill sets did you practice? (See Section 5)

How did this experience help you achieve your goals?

SECTION 9: DIVERSITY, EQUITY AND INCLUSION

What did you learn and what experiences did you have that you considered to be valuable and useful in life in in your job? See Chapter 5 and Chapter 7 for more information and the Plays in those chapters that relate to diversity, equity, inclusion, and belonging. You may use one line per experience.
Description (s) and Date (s)
What skills did you practice? (See Section 5)
How did this experience help you achieve your goals?

SECTION 10: ETHICAL PRACTICES/RESPONSIBLE SCHOLARSHIP TRAINING AND EXPERIENCES
What did you learn and what experiences did you have that you feel are valuable in your job and in your life? See Chapter 5 for more information and how the Plays in this chapter relate to ethics. You may use one line per experience.
Description (s) and Date (s)
What skills did you practice? (See Section 5)
How did this experience help you achieve your goals?

The MBS Degree Program is student-centered.

In addition to providing an MBS IDP Playbook for organizing all the elements of the MBS degree program, we recognize that an important endpoint is securing satisfying employment.

Since its inception, the MBS degree program has had an average of about 95% employment rate.

This chapter describes the numerous offerings available to help students find the jobs they are looking for during and after they receive their degree.

MBS: A community of professionals that facilitates your career search.

“Career Edge”

“Career Edge” helps to identify opportunities for entrepreneurially minded students to use design thinking to identify their desired jobs and careers. The secret strategy is a holistic, student-centered orientation. This way of thinking is part of the life-learning mindset that is sustainable and adaptive throughout the entrepreneur’s career.

In addition to the planning tools just described, Design Your Life and the MBS Playbook Plan, there are other career search individuals and fulfillment tools available to you.

ADVISORS

Faculty and Staff Advisors

One of the ways in which faculty and staff advisors can help you is to “demystify” the job titles, particularly in newly developed areas. For example, user design positions have become “hot” but given it’s in its infancy and developing as an opportunity, it may be difficult for those who are searching for jobs in this space to know what to look for. Faculty and staff can be very helpful in this regard.

Executive Coaches

Executive coaching is a valuable resource available to all students, from orientation to graduation and beyond.

The Rutgers MBS degree is distinguished not only by its cutting-edge, innovative curricula but also by its focus on academic-career alignment and professional and leadership development through executive coaching.

Working within a “Design Your Life (DYL)” framework and the MBS Playbook Plan and executive coaches, mentors, or advisors, you will work collaboratively with these tools and people to develop specific steps and actionable plans to define your career goals, achieve work-life balance, and chart a path to success both at MBS and beyond. Through one-on-one coaching and specialized workshops, you learn to make stronger pitches, network online, and enhance your resume and professional profile to stand out in today’s virtual, digital age.

Executive coaches provide both students and alumni with the tools, resources, and opportunities to become and remain innovators and leaders—working collaboratively to create and refine your MBS Lifelong Learning Dashboard that outlines personal and professional goals.

Alumni Advisors

MBS has a vast, varied, and engaged alumni community. They are always willing to help you through advising, serving as panelists, and sharing industry-specific knowledge.

1. Alumni-Student Mentoring Program: The Alumni-Student Mentoring Program is designed to offer guidance to MBS students throughout their graduate journey. Potential discussion topics might include ones that are program-specific, pertain to professional development, and are about networking, job searching, and skills needed for industry-related advancement.
2. During the leadership class, students are put in touch with alumni for their leadership interviews.
3. There are alumni-student get-togethers.
4. Alumni are called upon to make class presentations, to help with orientations and graduations. They fill the following roles with students:
 - a. Help clarify the mentee's goals and aspirations
 - b. Share the mentor's own experiences, resources, and networks with the mentee
 - c. Encourage the mentee to explore new ideas and opportunities
 - d. Offer constructive opinions, while respecting those of the mentee

Student Success Stories

Below are several students who describe their journeys from the start of the program to where they gained employment after receiving their MBS degree.

N.G., MBS '20 held leadership positions as a data scientist professionally as well as during her MBS externships and internships. She graduated with a concentration in Analytics. Her prior experience was with Mu Sigma Inc. in India as a Business Analyst for around two years which helped her develop her analytical skills as she worked on client projects and business requirements.

She then assumed a position as an assistant manager at WNS Global Services, where she worked in the retail analytics domain, covering campaign and loyalty management, ad hoc client requests, and trend analysis. She highly recommends planning for the semester in advance as it helped her to concentrate and prioritize her time based on her goals.

She was recognized by the PSM program with an Externship fellowship award for her commendable role as an extern lead at Stryker Corporation, where her team helped improve the data quality in the data governance model for medical products' lifecycle management. Not only did she manage her schedule between academics and the MBS Externship Exchange, but she was also involved as a data scientist intern with CIED Solutions. In her final semester, she was a revenue-management intern at Hapag-Lloyd and continues with this company today.⁴

T.T., MBS '13 is creating global impact as a program manager at Google. She graduated with a concentration in Kinesiology and Applied Physiology and currently works as a program manager at Google. She completed her undergraduate studies in exercise science and kinesiology prior to entering the MBS degree program. During her time at Rutgers as both an undergraduate and graduate student, she worked as a lab supervisor for the Office of Information Technology (OIT) for four years. She believes

that this experience enabled her to have a good understanding of how each component worked individually, and how to put them together in a way that made the system work faster and more efficiently as a whole, an understanding that eased her transition from kinesiology to computing.

During her internships in the MBS degree program, she realized that working in fitness centers was not necessarily a part of her career goals, so she explored a role at Stanford University in Computing for two years.

T.T. says she owes her current role at Google to her ongoing desire to learn and grow. She says that after four years in her previous position as a platforms management specialist, she felt she had reached the limit of what she could learn in that role; thus, she wanted to secure a role where she could practice and grow her technical and management skills further. Her close involvement with Google's internal telephony team while working on launching the Pixel Phones enabled her to transfer to a program manager role on the telephony team. She believes the internships through the MBS Internships Program played a crucial role in her success.

“Being hands-on in those environments was pivotal in helping me realize that working in a fitness center was limiting me. I knew that I was capable of having a larger, global impact. Google is a global company and the work that I do is not only impactful but gets magnified multiple times over.”⁴

D.O., MBS '17 graduated with a concentration in Data Analytics. Before enrolling in the MBS degree, she graduated from the University of Delaware with a Bachelor of Arts in Economics and a minor in Management Information Systems. The MBS degree program provided her with career flexibility and a diverse, supportive network that has helped throughout her career. She has worked as an analytics consultant for Deloitte, where she found that clear communication is essential, particularly the ability to structure thoughts to be conveyed clearly and linearly to both clients and coworkers. She currently is working in analytics at Meta.⁵

V.S., MBS '17 graduated with a concentration in Pharmaceutical Engineering. She originally pursued the MBS degree because she wanted to pivot into the pharmaceutical industry, and through the MBS degree program, she was able to gain the knowledge and skills to do so. She fondly remembers the Principles of Communication and Leadership course, where an assignment pushed her to conduct an interview with a Bristol Myers Squibb representative whom she had just met at a career fair. That exchange later opened doors for her when she was hired for a position at the same company. She now works at Pfizer as a Senior Manager in Financial Planning. Vishwa believes that making good first impressions is key and that the MBS degree program is an amazing place to start honing the networking and communication skills necessary to make good impressions and important connections.⁵

S.A.S., MBS '19 graduated with a concentration in UXD. He is an avid writer and maintains an educational blog for UX Engineers. He found that MBS courses such as Fundamentals of Analytics and Discovery Informatics and Principles of Accounting and

Finance for Science and Technology Management were extremely helpful, even though they covered topics and content outside his area of expertise. He therefore advises students to keep their eyes open for job postings and career opportunities that excite them, even if a position sounds like it might be outside one's usual comfort zone. He also believes that the ability to look at both the big picture and individual details of a situation is important for designers, both in conceptualizing design and when creating applications. He currently works as a Design Systems Designer at Amazon.⁵

Summary.

The MBS degree program recognizes that you are charting your own journey to create your own MBS experience and discover the right career path for you. This chapter shows the vast and diverse resources comprising faculty, staff, professionals, and tools that are made available to you to pursue a well-thought-out journey directed toward achieving your career goal, whatever that might be.

The MBS IDP Playbook is a critical tool for organizing your curriculum, and your experiences and helping to ensure that you will leave the program having taken full advantage of all that it offers. The MBS IDP Playbook is also “evergreen,” i.e., you can use the template to evolve your career and life aspirations and goals for the next 60+ years!

The playbook is based on the premise that you own your development, professionally and personally, and that you accept responsibility for your own learning. We hope the playbook will help you organize the inputs needed for your growth by helping you answer questions that will allow you to design your personal program for your career development and life satisfaction.

The Plays

Here are the “Plays” for thinking about and creating the career development plan that will lead you toward your desired career path.

Play 1: MBS IDP Playbook

Complete “The MBS IDP Playbook” and update as you progress through the program.

Check back in with your advisor or coach on a regular basis to assess your progress and to ask for feedback.

Play 2: Don’t wait to be anointed...Lead your own ship!

This command is simply meant to remind you to take the initiative to lead your own ship!

1. Are you taking the initiative to move forward? Do you need help with stepping out of your comfort zone?

2. Do you need a nudge for going big and bold?

Play 3: Lifelong Learning Mindset

This play is a reminder to see the bigger picture of how your MBS degree is a launching pad for a lifelong learning mindset that will be continuously useful to you throughout your career as you learn how to learn for maximum benefit.

1. Do you believe and act from a growth mindset?

2. Do you innovate by breaking the problem into smaller steps?

3. For new ideas, do you design-try, redesign-try, redesign-try...?

4. Are you looking for opportunities to learn new skills?

5. Are you reviewing other ways to enhance your lifelong learning mindset?

6. How would you summarize?

7. What are you concluding?

8. What are your next steps?

Play 4: Now think about how you would use this MBS IDP Playbook for your career goals:

1. 3 years from now
 2. 5 years from now
 3. 10 years from now
 4. 30 years from now
-
- a. For each timeframe, what information would you need to have to continuously update your MBS IDP Playbook?

 - b. How might your life change that would affect the kind of information you would need to fill out this MBS IDP Playbook?

CHAPTER 9: NOTES

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Chapter 10

Designing Your Future

Where the Lifelong Learning Mindset Becomes the Learner

“We keep moving forward, opening new doors and doing new things, because we are curious, and curiosity keeps leading us down new paths.” Walt Disney

Achieving a milestone is rewarding.

Congratulations on completing your degree and launching yourself into the next chapter of your life! Let’s review Dr. Silver’s comments from her most recent graduation speech, how far you’ve come, what you’ve experienced, and how you’ve benefitted.

“By completing your degree at MBS, you have gained the skills to be flexible and resilient workers. MBS has equipped you with both the human and technical skills to navigate new complex, shifting workplaces.

AI is one of the many emerging tools that you will have to learn to master in the workplace. For this graduation speech, I asked ChatGPT, ‘What are the top 10 things every graduate should know?’ Here is what ChatGPT recommends. All these ChatGPT items seem eerily similar to what we’ve covered in the MBS degree program, and I promise I didn’t set up ChatGPT!

1. Finance
2. Time management
3. Communication skills
4. Networking
5. Digital literacy
6. Problem-solving
7. Leadership

These first seven directly correspond to most of the required (or strongly suggested elective) courses in the MBS.

8. Self-care

This one needs no explanation. You and your families’ health and wellness are really first and second. We put it here just as a break to discuss the next two.

9. Lifelong learning.

This has been part of every graduation speech for the past 10 years. Your career will be a marathon, not a sprint. Recently, the WSJ published an article, ‘Here Comes the 60-Year

Career.’ As people live longer, healthier lives, the traditional 40-year career will become a thing of the past. But that’s going to require a new mindset—and a lot more planning.

And a big part of that is learning. As Thomas Friedman, the NY Times writer, said, ‘If you want lifelong employment, you need lifelong learning.’ Keep learning, keep improving, you can learn from everyone and everything.

As part of your master’s degree, we introduced you to ‘Design Your Life,’ i.e., design your master’s experience, design your work life, use design thinking. Design thinking is an iterative human-centered (not AI) approach to creative problem-solving. Figure out what the problem is, ideate, try it out, and iterate.

Design thinking and the ‘Design Your Life’ approach are purposely woven throughout our entire program, as it is something you can take with you after the master’s program is complete.

What you really learned in your master’s program...is how to learn, how to figure out what you need to learn, how to curate your learning experience, how to try it out, and most importantly—how to adapt and modify as you go.

And even when you plan ahead, there is always ‘Odyssey Path 3’ for the outside, orthogonal, wild-eye journey, and be ready to take it!

And lastly,

10. Stay in touch. As we’ve said throughout, we want to hear from you. We want you to be an active member of our alumni community. And when you graduate, we won’t go away either. We’ll still be here to offer you help and support.

Nobel Laureate, Daniel Kahneman’s famous mathematical expression is:

$$\text{Success} = \text{Luck} + \text{Talent}$$

He then added, ‘And mainly, the luck is with the people you meet and the friendships you make.’ So, stay in touch!”

Is it too early to think about your future?

But what about the future? Is it too soon to think about how this chapter of your life will seamlessly lead to the next chapter and the next chapter after that? Perhaps not, and here is why.

As many have mentioned, your career could easily span 40-60 more years. Your MBS degree program laid the foundation for your current position but also provided the tools for lifelong learning, lifelong career planning, and lifelong career success. How does planning for the future work?

Let’s first start with some data on how people think about the future. Do you think about your future?

Jane McGonigal, Research Director at the Institute for the Future, a non-profit based in Palo Alto, California, conducted a survey of 2,818 people who were asked to reflect on how frequently they imagine something that might happen or do at different times in their future.

The survey found that:

- 1. Thinking 30 years out is rare. 53%** of Americans say they rarely or never think about something that might happen or something they personally might do, at least 30 years from the present.
 - a. 15% think about it once or twice a year
 - b. 15% once or twice a month
 - c. 17% think about it once a week (7%), several times a week (5%) or every day (5%).
- 2. Looking 10 years ahead is somewhat less rare. 37%** rarely or almost never think about something that might happen at least 10 years into the future.
 - a. 15% think about it once or twice a year
 - b. 19% think about it once or twice a month
 - c. 30% think that far out once a week (12%), several times a week (10%) or every day (8%)
- 3. Thinking five years into the future is more common—27%** rarely or never think about their lives at least five years from the present.
 - a. 15% think about it once or twice a year
 - b. 22% think about it once or twice a month
 - c. 38% think five years out once a week (12%), several times a week (15%), every day (11%)
- 4. Considering the future three years out is more common still—19%** think about the future almost never (6%) or rarely (13%).
 - a. 13% think about the future once or twice a year
 - b. 21% think about the future once or twice a month
 - c. 47% think about the future three years out: once a week (14%), several times a week (20%) or every day (13%)
- 5. Looking ahead one year happens often only 6%** rarely or almost never think about the future one year out.
 - a. 6% think about it once or twice a year
 - b. 19% think about it once or twice a month
 - c. 70% think about it once a week (14%), several times a week (30%) or every day (26%)

McGonigal concludes: *“This leaves us with a kind of ‘future gap’ in America. Some people are regularly connecting with their future selves while a greater majority are not. And this matters, because the consequences of a lack of forethought can be profound in both our personal lives and our collective wellbeing. Studies show the less people think about their future lives, the less self-control they exhibit and the less likely they are to make choices that benefit the world in the long run. People who don’t think about the future vote less often, save less for retirement, make poor health decisions, procrastinate more, have a harder time resisting temptation, are more likely to drop out of school or be arrested, care less about long-term challenges like climate change, show less resilience*

in the face of tough obstacles, as reported in the scientific literature on the impact of future thinking.”¹

So, which are you? The half (53%) that rarely or never think about the 30-year time horizon or the other half that thinks about the future but infrequently?

Other research shows that for those who envision possible futures, i.e., “prospection,” this envisioning results in positive outcomes, i.e., making more prudent decisions, motivating them to achieve their goals, improving their psychological well-being, and making them kinder and more generous.²

So, thinking about your future seems to have benefits. How might we apply these findings to the jobs and careers that you will be seeking for yourself in the future?

Projections about career opportunities in the future are varied, uncertain, and unpredictable.

Back to the future, the McKinsey Global Institute provided the following findings from their report on “The Future of Work” based on its analysis of eight countries with diverse markets that account for half the world’s population and 60% of its GDP.

1. *“One in 16 workers may have to switch occupations by 2030. That’s more than 100 million workers across the eight economies studied—and the pandemic accelerated expected workforce transitions.*
2. *Job growth will be more concentrated in high-skill jobs (for example, in healthcare or science, technology, engineering, and math [STEM] fields), while middle- and low-skill jobs (such as food service, production work, or office support roles) will decline.*
3. *A few job categories could see more growth than others. The rise of e-commerce created demand for warehouse workers; investments in the green economy could increase the need for wind turbine technicians; aging populations in many advanced economies will increase demand for nurses, home health aides, and hearing-aid technicians; and teachers and training instructors will also continue to find work over the coming decade.*
4. *But other types of jobs may be at risk: for example, as grocery stores increasingly install self-checkout counters, there may be a need for fewer clerks, and robotics used to process routine paperwork may lessen demand for some office workers.*
5. *The pandemic accelerated three broad trends that will continue to reshape work as the effects of the crisis recede: remote work and virtual meetings, e-commerce, and faster adoption of digital technologies, including automation and AI.”³*

The National Intelligence Council’s Strategic Futures Group in consultation with outside experts created a report of Integrated Global Trends published in March 2021 that addressed future trends.

“During the next two decades, technological innovations—including automation, online collaboration tools, artificial intelligence, and additive manufacturing—will reshape some fundamental aspects of how and where people work.

The future workplace is likely to be increasingly flexible but also increasingly insecure as companies demand new skill sets while no longer providing employees with traditional benefits. A key uncertainty is whether the labor force will adjust quickly enough to meet the demands of the new working world.

Scholars agree that although technological innovations will eliminate many jobs, they will also create new ones as firms shift labor into complementary tasks. However, the skills required and the locations of these jobs may not match the capabilities of the labor force—putting pressure on already stretched governments to help labor markets manage these new conditions.”⁴

What seems to be true from these and other articles that make projections about the future workplace...over time, “Nothing endures but change. There is nothing permanent except change. All is flux, nothing stays still.” (Heraclitus, Greek Philosopher)

So, if change is the constant, how do you manage that?

Creating future opportunities amidst uncertainty.

When thinking about your career future, research by Hal Hershfield at UCLA found that when individuals consider future scenarios, they don't put themselves in those scenarios but place a stranger in those scenarios. However, he found that if you put yourself in those scenarios, you are likely to get more realistic, relevant options. Hershfield found that people who spend a few minutes getting acquainted with a computer-generated simulation of what they might look like in the future were motivated to make better decisions about retirement planning.

“When people think of themselves in the future, it feels to them like they are seeing a different person entirely ... like a stranger on the street,” said Hal Hershfield, a social psychologist at UCLA Anderson who is exploring how human behavior can be modified by bringing people closer to their future selves.

He's found that the emotional disconnect we have with the person we will become in 20 to 40 years could explain, for example, why many people don't save enough for retirement; why they continue to indulge in unhealthy behaviors, accepting the risk of incurring terrible diseases in the future; and why they make bad ethical decisions despite knowing that they might suffer consequences down the road.

‘One of the reasons people fail to make good choices and don't act in ways that are positive in the long term is because they feel a sense of emotional disconnect from their future selves,’ said Hershfield, an assistant professor of marketing at UCLA Anderson who's been following this line of research for seven years.

For most people, said Hershfield, ‘right now’ is a lot more important than anything in the future. The big question guiding our research is: How do you get people to step out of time a bit, to connect with themselves over time? Is there a link between future-oriented behavior and how emotionally connected people feel to their future selves?

Working with a computer program capable of aging people's photographs, Hershfield and his colleagues showed that people who see vivid pictures of their future faces — sparse hair going gray, age spots, a padding of subcutaneous fat — are willing to allocate more money — about twice as much — to a hypothetical long-term savings account.

This lack of relationship between our present self and our future self is at the core of many of the behavior problems in our society—from not saving enough for our retirement, to why we continue to indulge in unhealthy behaviors putting us at risk of diseases in the future, to why we don't alter our present-day-actions to preserve the earth for our future generations.”⁵

Creating your future opportunities.

What does this research suggest about how to create your own future? One of the reasons our program emphasizes DYL and IDP is to make sure you think about your current self and think about your post-master's self (i.e., five years ahead).

Whether you are considering a job change that involves moving up, moving out, or moving to an entirely different industry, this MBS IDP Playbook and the MBS ecosystem can help you evaluate your next steps. In the same way you used the MBS IDP Playbook to assess where you currently are and identify where you might like to go, do the same for a new future phase of your career. Look at the gap between your assessment of current and future. What do you need to do to address that gap?

Your MBS degree gives you a ticket into the MBS ecosystem that includes team members and strategic planning and structures, i.e., the tools for lifelong learning that help to ensure a good future career direction by addressing areas of strengths and gaps to be filled.

The MBS degree program is not a “one-and-done” solution. Use this Playbook as a template for continuous learning and growth to meet your career and even lifelong goals, no matter how many twists and turns your future self and career might take.

A review of creating your next chapter...

Adopt a growth mindset and construct your short-term and long-term plan with flexibility, adaptive behavior, and good questions. The good news, presented in a Pew Research Center Survey, reported that there are many who report they are lifelong learners...

1. *73% of adults consider themselves lifelong learners.*
2. *74% of adults are what we call personal learners – that is, they have participated in at least one of a number of possible activities in the past 12 months to advance their knowledge about something that personally interests them. These activities include reading, taking courses or attending meetings or events tied to learning more about their personal interests.*

3. *63% of those who are working (or 36% of all adults) are what we call professional learners – that is, they have taken a course or gotten additional training in the past 12 months to improve their job skills or expertise connected to career advancement.*⁶

Use and adapt your MBS IDP Playbook to help you create your new career chapters. Having practiced with this tool during the MBS degree program, you should be able to adapt it to a new set of criteria. Upon your graduation, reflect on the journey you've taken and how far you've come from where you started, i.e., learning how to learn...to becoming a full-fledged lifelong learner!

Back to the idea we introduced in the first chapter:

$$\text{Learning Success} = f(\text{MBS} * \text{You})$$

The MBS degree program provides the context, environment, and culture for you to succeed, but you must engage to see both the immediate and long-term rewards of the MBS degree program.

As one recent graduate shared his MBS journey of growth and learning...

“Halfway through my MBS Journey, I left my job at Rutgers and took my first steps toward my career goals. This landed me at Eli Lilly working as a Research Associate where I quickly put my skills to use. I pushed for the implementation of a second-verification program so that the results of any given test are strengthened by a complete and verified audit trail. I implemented a lean mentality into the labs so that analysts are able to find what they need, get their respective tests started, and have more time to dedicate to career development. I was able to work closely with vendors and technicians to learn the ins and outs of the many laboratory instruments so that when an issue would arise, it could potentially be handled in house and therefore save the department some money on those costly repairs.

I soon found myself wanting more and making another change. I left Eli Lilly and Joined BMS and became a Compliance Specialist. This change allowed me to make the transition from being in the lab 50% of the time to not being in the lab at all. Here I was able to grow and flourish, quickly became a Senior Compliance Specialist, and continue to add to my SME repertoire. Currently, I am looking to take a stab at something new and delve into the world of project management. I have done some PM work in the past and would welcome the challenge of further incorporating the lean and PM mentality into the QC/Regulatory realm. Lastly, I would be remiss if I did not mention that after seeing me go through the MBS program, my wife decided to go back to school and is in year 2 of the PharmD program at Manchester University in Indiana.

The MBS program exposed me to like-minded people that showed me how to continue learning. From guest speakers that took time out of their busy schedule, to staff that made every effort to be available, to classmates that helped foster the learning environment, I gained a lot more than I expected. I graduated in 2020. While not exactly how I planned,

it was way more than what I could have imagined. When I started my MBS journey, it was because I wanted to find a better job. I had a good job, but there was something missing. The MBS program helped me find it and allowed me to open doors that I believe would have otherwise remained closed.” M.E.L., Drug Discovery & Development, MBS ’20

Making the transformation from learning how to learn when you enter the program, i.e., adopting a lifelong learning mindset to becoming a lifelong learner, is the ultimate goal that will serve you well throughout your life.

Call upon your MBS advisors, mentors, and coaches. Continue to improve your leadership skills. Tap into and participate in the MBS network that has a far bigger footprint with resources and influence than you could have ever imagined! And feel free to use this playbook as your guide!

How the MBS Degree Program will support your lifelong learning mindset.

Ann Kirschner Ph.D., President and Founder of Comma Communications providing advisory services for institutions and organizations focused on innovation in media, technology, and education, made the case for a different kind of program that tapped into a more central role for lifelong learning in graduate education. She suggested that...

1. *“Instead of having a narrow interpretation and mission for a school’s career services department, a new department headed by a Dean-of-the-Rest-of-Your-Life be created. Kirschner recommends that the new dean should be charged with building strategic employment partnerships and with tracking changing job markets.*
2. *In the reimagined university, the importance of career counseling and lifelong learning shifts from the end of a student’s academic career to the beginning. Admission acceptance packets include information from the career services staff, including the types of available internships, career counselling seminars and a list of career counsellors.*
3. *Information on lifelong learning services is also included in the acceptance packet, setting the stage for the accepted student to realize that learning begins from the time of acceptance and continues through enrolment to graduation and beyond graduation.*
4. *Current students are offered, on a regular basis, seminars designed to enhance job-readiness.*
5. *A dean of career counselling and lifelong learning is appointed by an institution’s president or vice-chancellor and holds a seat in the cabinet. A career counselling and lifelong learning committee includes the director of career counselling, the director of lifelong learning, academic deans, representatives from the admissions, research and alumni offices, the registrar, faculty with industry experience and an outside representative from industry.*
6. *The committee, in concert with academic deans, develops lists of lifelong learning courses available to graduates and also provides information on courses offered in partnership with alternative educational providers, like Udacity, Google and Coursera.*
7. *The committee works with the registrar to design a transcript listing not just the courses taken during a student’s academic career, but the competencies learned in each course. J Philipp Schmidt, director of learning rethinking at the MIT Media Lab, puts it best: “The*

purpose of credentials is changing. They are moving from a sorting mechanism to a representation of a person's competency.”⁷

As MBS graduates who are looking to grow and will come back to the MBS degree program over the course of their lives, here is how the MBS degree program is planning to support its graduates in their lifelong learning mindset and evolving career goals. (We are doing some of these, not all...)

1. Offering courses to alumni.
2. New leadership development and group coaching effort that is being launched.
3. Opportunities for alumni to teach (in Capstone, externship, and many other courses).
4. Networking with MBS alumni.
5. Networking with students at our annual get-together (during spring break) or joining us for our holiday party.
6. Joining the formal mentoring program.
7. Joining the Industrial Advisory Board.

In conclusion, we promise to do what we've said, ideate, try it out, and iterate until “home runs” happen! The way we make it all happen is to throw in our own unique, student-driven plays, delivered with curiosity, collaboration, resilience, passion, integrity, resourcefulness, creativity, empathy, and smarts!

This is not saying goodbye but saying hello to your bright, evolving, future career opportunities! We look forward to your thoughts and ideas and to seeing you again!

“The best way to predict the future is to create it.” Abraham Lincoln, Peter Drucker, Alan Kay

CHAPTER 10: NOTES

Thanks to those who were interviewed or quoted for the content of this chapter: David Finegold, Manuel Enrique Lopez.

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