ON-CAMPUS PROGRAM 2022-23

For students that matriculated prior to December 2022.
The rules and regulations stated in this handbook are for information only and in no way constitute a contract between a student and Cornell University. The University reserves the right to change any regulations or requirements at any time.

Cornell University's history of diversity and inclusion encourages all students, faculty, and staff to support a diverse and inclusive university in which to work, study, teach, research, and serve. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally protected status or subjected to prohibited discrimination involving, but not limited to, such factors as race, ethnic or national origin, citizenship and immigration status, color, sex/gender, pregnancy or pregnancy-related conditions, age, creed, religion, actual or perceived disability (including persons associated with such a person), arrest and/or conviction record, military or veteran status, sexual orientation, gender expression and/or identity, an individual’s genetic information, domestic violence victim status, familial status or marital status. Cornell University is an affirmative action/equal opportunity employer.

The Office of Institutional Equity and Title IX (OIETIX) responds to bias incidents and protected-status harassment involving staff and faculty, and sexual and related misconduct involving students, faculty, and staff. OIETIX can provide information about and referrals to resources, implement supportive measures, and conduct incident response education for accused individuals. OIETIX also has the authority to investigate and adjudicate claims of misconduct under Policy 6.4. If you have any questions, please email OIETIX at titleix@cornell.edu (for sexual harassment or other sexual misconduct) or equity@cornell.edu (for other protected-status harassment, prohibited discrimination, or bias), and/or visit titleix.cornell.edu.
# TABLE OF CONTENTS

## SECTION 1 - INTRODUCTION

1.1 The Engineering Management Program ................................................................. 4  
1.2 The Master of Engineering (M.Eng.) Degree in Engineering Management (EM) ........ 4  
1.2.1 Preparation in Probability and Statistics ......................................................... 5  
1.2.2 Program Requirements ..................................................................................... 6  

## SECTION 2 – PROGRAM PLANNING and POLICIES

2.1 Assignment of Advisor ....................................................................................... 8  
2.2 Course Registration ............................................................................................. 8  
2.3 Planning Your M.Eng. Program .......................................................................... 8  
2.4 Filing and Approval of Your Course Program .................................................... 9  
2.5 Program Changes ............................................................................................... 9  
2.6 Petitions ............................................................................................................. 9  
2.6.1 Leave of Absence ......................................................................................... 9  
2.6.2 Withdrawal .................................................................................................. 10  
2.6.3 Three Semester Degree Option ...................................................................... 10  
2.6.4 Transfer Credits ......................................................................................... 10  
2.7 Grade Requirements ......................................................................................... 11  
2.8 Office Space and Building Access ..................................................................... 11  
2.9 Career Services ................................................................................................. 11  
2.10 Transferring from On-Campus to Online Learning ........................................... 12  

## SECTION 3 - PROFESSIONAL CONDUCT and SPECIAL NEEDS

3.1 Academic Integrity and Plagiarism ...................................................................... 12  
3.2 Student Disability Services ............................................................................... 12  

## APPENDICES

A Engineering Management Program Faculty and Their Interests ............................. 13  
B M.Eng./MBA Program ......................................................................................... 14  
C Master of Public Administration (M.P.A.) from the Cornell Institute for Public Affairs (CIPA) ...... 15  
D Prerequisite Skills in Probability and Statistics .................................................... 16  
E Program Requirements, Proposal Form, and Track Specialization Electives ............. 18
F  Courses of study for ENMGT 59XX series and other key courses ................................................................. 25
G  Professional Experience Program and Independent Study ................................................................................. 28
H  Johnson Immersion Programs ........................................................................................................................ 29
SECTION 1 - INTRODUCTION

Welcome to Cornell University and the Engineering Management Program. This handbook gives an overview of our Master of Engineering degree and our policies.

1.1 The Engineering Management Program

The Engineering Management program at Cornell has been training technical leaders since 1988. Each year we attract top students from a variety of engineering fields including mechanical, biomedical, civil, electrical, computer science, industrial/operations research, chemical, applied and engineering physics, and environmental engineering. We have more than 1,100 Engineering Management alumni who hold leading positions in engineering, product management, finance, consulting, research and development, manufacturing, sales, education, construction management, and government in the U.S. and around the world.

Faculty and others responsible for administering the program include:

**Director**
Patrick Reed, 211 Hollister Hall, patrick.reed@cornell.edu

**Program Coordinator**
TBD, 215A Hollister Hall, email TBD

**Student Services Program Manager**
Celia Szczepura, 215 Hollister Hall, cs249@cornell.edu

The Engineering Management program is administered by the School of Civil and Environmental Engineering (School). Faculty and others responsible for administering the School include:

**Director**
Linda Nozick, 311 Hollister Hall

**Director of Administration**
Joe Rowe, 220 Hollister Hall

Support staff for Engineering Management and the School:

**Communication Specialist**
Charissa King-O’Brien, 220 Hollister Hall

**Finance Specialist**
Stacey Shirk, 220 Hollister Hall

**Accounts Coordinator**
Chelsea Dodge, 220 Hollister Hall

**Assistant to the Directors**
Jeanette Little, 220 Hollister Hall

**Information Technology**
Cameron Willkens, 325 Hollister Hall

**Facilities Coordinator**
Thom Quinn, B14A Olin Hall

**Administrative Assistants**
220 Hollister Hall

1.2 The Master of Engineering Degree in Engineering Management

The Master of Engineering (M.Eng.) degree in Engineering Management (EM) gives students business skills while increasing their technical depth through coursework, team projects, and dynamic class discussions. The degree requires 30 credit hours consisting of coursework in major and supporting areas as well as a capstone project. EM students are also required to take two additional one-credit seminars (Professional and Leadership Development Seminar in the Fall and Seminar: Project Management in the Spring) for a total of 32 credits minimum to graduate. The M.Eng. degree can be completed in two semesters of intensive study. A maximum of two credit hours graded on an S/U basis, such as seminar or their equivalent, may be included provided they are participatory in nature.

Our curriculum focuses on three main areas: leading people, advancing your business, and disrupting your field. Students learn to identify problems, analyze data, and interpret the results of analyses for managerial action. The business context of the issues and decisions is also important, and the program mixes courses from the College of...
Engineering with courses from the Johnson Graduate School of Management, and the School of Industrial and Labor Relations to provide that larger context.

**LEAD PEOPLE**
- Engineering Leadership
- Project Management
- Negotiations and Contracts
- Systems Thinking
- Communication and Presentation Skills

**ADVANCE YOUR BUSINESS**
- Decision Framing and Analytics
- Data Analytics
- Risk Analysis and Management
- Economics and Finance for Engineering Managers
- Operations and Supply Chain Management

**DISRUPT YOUR FIELD**
- Managing a Culture of Innovation and Entrepreneurial Thinking
- Design Thinking for Complex Systems

By the end of your Engineering Management program, you will also develop strong competencies in the following areas:

- Project Leadership
- Communication and Presentation Skills
- Ethics
- Business Savvy
- Systems Thinking
- Sustainability/ Triple Bottom Line
- Analytical Skills
- Working with Customers
- Social Technology Trends

The program is designed to appeal to students from different disciplinary backgrounds with varying career goals, the core tools taught in the program are augmented by a set of specialization courses that allow students to develop expertise in particular application areas. Appendix E provides more details on how these various program elements are reflected in specific curricular requirements.

For some students (especially those whose career interests focus on engineering companies), the Master of Engineering degree in Engineering Management can be viewed as an effective alternative to an MBA degree, because it focuses on the mix of technical skills and project management skills that are valued in many corporate environments. However, for other students, the combination of the M.Eng. degree and an MBA is attractive, and Cornell offers a joint program between the Engineering College and the Johnson Graduate School of Management leading to both degrees (usually after a total of five semesters). Appendix B provides additional details on M.Eng./MBA joint degree program.

### 1.2.1 Preparation in Probability and Statistics

Students from all fields of engineering are welcome. The core elements of the program do not require specific knowledge from any particular engineering discipline. However, we require that all incoming students have a basic background in probability and statistics. This knowledge is generally obtained in a one-semester undergraduate class. At Cornell, the typical courses used by undergraduates to satisfy this requirement are ENGRD 2700, CEE 3040, or ECE 3100. Appendix C describes the material that you should understand to meet this background requirement.
If you have not had a course in probability and statistics as an undergraduate, you may arrange to take such a course over the summer preceding enrollment as an M.Eng. student, or you will have to take such a course (as an overload) during the first semester of your M.Eng. program. The credits for this course do not count toward the 32 credits required to complete the degree. We strongly encourage students to satisfy this preparation requirement prior to entering the program because it is used in Fall courses, particularly the required course ENMGT 5930, Data Analytics.

1.2.2 Program Requirements

All students need at least 32 credits to graduate.

Required Core Courses

- Project Management
- Engineering Management Project
- Data Analytics
- Economics and Finance for Engineering Management
- Decision Framing and Analytics
- Professional and Leadership Development Seminar
- Seminar Project Management

One Course in Organizational Behavior

- Negotiations and Contracts for Engineering Managers
- Contemporary Challenges for Engineering Managers
- Managing a Culture of Innovation

Specialization Electives

- Seven specialization tracks with at least nine credits of electives
- Mix and match across specializations
- Build your own track (most popular)

Required Courses:

ENMGT 5900 – Project Management (Fall or Spring, 4 credits)
ENMGT 5910* – Engineering Management Project (Fall or Spring, 4 credits)
ENMGT 5930 – Data Analytics (Fall, 4 credits)
ENMGT 5940 – Economics and Finance for Engineering Management (Spring, 4 credits)
ENMGT 5980 – Decision Framing and Analytics (Fall, 3 credits)
ENMGT 6090 – Professional and Leadership Development Seminar (Fall, 1 credit, non-graded)
ENMGT 6091 – Seminar: Project Management (Spring, 1 credit, non-graded)

*ENMGT 5910 may only be taken in the second semester of your program (or third semester for students who opt for a three-semester program).

Organizational Behavior:

A three-credit organizational behavioral course is required. You cannot take a half-semester course (e.g., 1.5- or 2-credit) to meet this requirement, as is permitted for the Track Specialization requirements.

Recommended Individual and/or Organizational Behavior courses include ENMGT 5960 – Negotiations and Contracts for Engineering Managers; ENMGT 6095 – Contemporary Challenges for Engineering Managers; ENMGT
6020 – Managing a Culture of Innovation; NCC 5530 – Marketing Management; NCC 5540 – Management and Leading in Organizations; NBA 6630 – Managerial Decision Making; or ILROB 5200 – Organizational Behavior and Analysis; other courses are also possible.

The information provided here should help you make decisions, but we encourage you to seek guidance from your advisor and other faculty members. An important aspect of the program is interaction between each student and his/her faculty advisor. Your advisor will work with you to develop a program consistent with your career goals and the intent of the M.Eng. program.

Suggested alternatives (3 credits unless otherwise noted) are:
- AEM 5110 – Design and Innovation
- HADM 6110 - Negotiations in the Hospitality Industry
- HADM 6130 – Entrepreneurial Management
- ILROB 5200 - Organizational Behavior *(Must be admitted in person by the Professor.)*
- NBA 5150 - Leadership Theory and Practice *(This is an intensive, 1-week course that meets before the semester starts, so if you choose to take it you would need to make travel plans accordingly. We highly recommend you take it in the Fall semester because the Spring semester typically is very popular and has a wait list).*
- NBA 6090 - Digital Marketing
- NBA 6200 - Marketing Research
- NBA 6540 - Power and Politics in Organizations (1.5 credits) *(You must take both the first and second seven-week sections of this course to meet the 3-credit requirement.)*
- NBA 6620 – Brand Management (1.5 credits)
- NBA 6630 - Managerial Decision Making
- NCC 5530 - Marketing Management
- NCC 5540 – Managing and Leading in Organizations
- PADM 5570 - Corporate Responsibility
- PAM 5130 – Behavioral Economics and Public Policy

**Electives:**
Beyond the above requirements, students must take at least nine credits of electives that can fall under a specialization or the “build your own track” option.

Please review detailed information about courses used to satisfy degree requirements in Appendix E. Appendix F provides course descriptions for the required courses and the most popular choices of courses in the most common areas of specialization.

The information provided here should help you make decisions, but we encourage you to seek guidance from your advisor and other faculty members. An important aspect of the program is interaction between each student and his/her faculty advisor. Your advisor will work with you to develop a program consistent with your career goals and the intent of the degree program.

**Capstone Project:**
All students must complete a capstone project and register for ENMGT 5910 in their final semester. Management responsibilities in a technical environment (and increasingly in many business environments) are often focused on projects, where a combination of resources (people, equipment, money, etc.) must be brought together to achieve a specific outcome within both, schedule and budget constraints. This importance of projects is reflected in this program through a strong focus on project management – the combination of “people skills” and “technical skills” necessary for successful project completion.
Project topics and sponsors are presented to students in ENMGT 5910 early in the semester. Students rank their preferences and teams are formed. Some project sponsors require Assignments of Intellectual Property Rights and/or Non-disclosure Agreements (NDAs) in order to participate in their projects.

SECTION 2 – PROGRAM PLANNING and POLICIES

2.1 Assignment of Advisor

You will be assigned an advisor prior to orientation to help you design a program of study, and to generally assist and advise you throughout your degree program. You may request to change your advisor to another eligible faculty member with the permission of the faculty member whom you would like to serve as your new advisor.

After orientation, set up an appointment with your advisor and take responsibility for registering for all required courses by the add/drop deadline.

2.2 Course Registration

Course registration is done online by logging onto Student Center with your Cornell NetID* during your three-day pre-enrollment appointment period, and to add, drop or swap classes for the current semester during the add/drop period. For detailed instructions see how to add a class, or make changes to your class requests.

Please refer to the registrar’s calendar for specific dates each term.

Any changes in your course registration after the deadlines (i.e., add/drop, credit hour changes, etc.) require submission of a Course Enrollment Petition to the Engineering Registrar’s office within the College of Engineering. The petition must be signed by both your advisor and the course instructor. Please note that petitions are not automatically approved.

*Cornell NetID: You should have received your Cornell NetID and information from Cornell Information Technologies (CIT) over the summer. If you did not, please contact the CIT Office at HelpDesk@cornell.edu. Please be sure to check your Cornell email regularly.

2.3 Planning Your M.Eng. Program

Please review the material in this handbook for both required courses and appropriate elective courses before meeting with your advisor. You can also review the online Course Roster to identify possible courses for both the Fall and Spring terms, including course listings in the Johnson Graduate School of Management and the School of Industrial and Labor Relations, and various other departments within the College of Engineering. The Spring roster becomes available during the Fall semester. Program planning is done with the aid of the M.Eng. Proposal Form for Engineering Management (see Appendix E).

2.4 Filing and Approval of Your Course Program

After a “final” program of courses for the entire year is agreed upon with your advisor, please submit your Proposal Form here after the first three weeks of classes. It will then be sent to your advisor for confirmation of his/her approval, and then to the Director of the Engineering Management Program for final approval. You will receive an email confirmation once your program form is approved.
2.5 Program Changes

Students often propose changes to their program at the start of their second semester that reflect changes in interests and/or course availability. All changes to your approved M.Eng. program must take the form of a revised proposal. Revised proposal forms follow the same process described above in Section 2.4.

It is important that any changes in your program be submitted and approved promptly because the current version of your proposal form that is on file serves as a checklist for determining compliance with graduation requirements.

2.6 Petitions

Cornell University has a long-standing tradition of considering petitions from students relative to special situations or circumstances that could justify exceptions to the normal rules or requirements. Petitions are considered by the Engineering Management Director. While we are not encouraging use of a petition to circumvent requirements, we do want to point out the existence of this process.

2.6.1 Leave of Absence

A leave of absence may be voluntary, health-related, or required. A description of each follows:

Voluntary Leave

Students sometimes find it necessary to suspend their studies. To do this, they must petition for a leave of absence for a specified period of time and receive written approval.

M.Eng. students request leaves using the University’s online Leave of Absence and Withdrawal system. You can access this system at https://www.engineering.cornell.edu/engr.registrar/leave-absence-and-withdrawal. A leave of absence is granted for at least one semester and not more than one year. Students must obtain written approval to extend their leave before it has expired, or they will be considered withdrawn from the program and will be required to reapply for admission.

A leave of absence granted during a semester goes into effect on the day it is requested. If a leave is requested after the 57th day of a semester, the courses in which the student was registered at the time of the request are treated as having been dropped (i.e., a “W” will appear on the transcript for each course). Students are responsible for any outstanding tuition or other university charges owed through that date. On-campus housing and dining charges are handled separately by the student with those Cornell departments.

To rejoin from a leave of absence, students must (1) satisfy any conditions established at the time the leave was granted and (2) notify the department in writing at least six weeks before the beginning of the semester of their intention to rejoin, describing how they satisfied any conditions established at the time the leave was granted.

Health Leave

Health leaves are granted by the college only upon recommendation of a physician or therapist. Although circumstances may vary, such leaves are generally granted for at least one full academic year with the understanding that the student may return at the beginning of any semester after the medical condition in question has been resolved. Students must satisfy Cornell Health that the condition has been corrected before they may return. The student’s academic standing will also be subject to review both at the time the leave is granted and upon the student’s return.

Required Leave
A required leave of absence may be imposed by the department in cases in which a student fails to meet the requirements for good standing. Leaves are given when the probability of success is increased substantially by deferring the student’s return by one semester (or, in unusual circumstances, one year). Required leaves take precedence over voluntary leaves.

Students wishing to rejoin the program should contact the Program Coordinator to determine what materials will be required of them to be considered for reentry. This must be done at least six weeks before the beginning of the semester in which the student wishes to return.

2.6.2 Withdrawal

A withdrawal from the College of Engineering may be voluntary or required. Following is a description of each:

Voluntary Withdrawal

Students who voluntarily withdraw from the program sever their connection with the college. Students who wish to withdraw should notify the Program Coordinator.

A withdrawal granted during a semester goes into effect on the day it is requested. If a withdrawal is requested after the 57th day of a semester, the courses in which the student was registered at the time of the request are treated as having been dropped (i.e., a “W” will appear on the transcript for each course). Students are responsible for any outstanding tuition or other university charges owed through that date. On-campus housing and dining charges are handled separately by students with those Cornell departments.

Required withdrawal

A department may require a student to withdraw from the program only when their overall record indicates that they are either incapable of completing the program or not sufficiently motivated to do so. This action severs their connection to, and withdrawals them from, only the M.Eng. program and does not, in and of itself, adversely affect their ability to transfer and complete a degree in another program at Cornell. Required withdrawals take precedence over voluntary withdrawals.

2.6.3 Three Semester Degree Option

A student who wishes to pursue a third semester of study must notify the Director prior to the start of his or her second semester. At that time, the student must devise a suitable plan of study for the third semester and submit a revised proposal form reflecting this plan. The plan must consist of twelve or more credits in the third semester, at least six of which are program requirements. This plan must be approved by the student’s advisor and the Director who will establish conditions for successful completion of the proposed program. The degree will not be awarded until these conditions are met. Under this option, the student is committing to a third semester of full tuition. International students should make arrangements to extend their visa through the end of their program.

2.6.4 Transfer Credits

Students may transfer up to nine credit hours of Master’s-level coursework if they have not been used toward a conferred degree and upon program approval. Transfer requests must be submitted and approved within 30 days of enrollment in the first academic semester of your program. Students must submit a Transfer Credit Application Form, transcript, a course description, and a syllabus for any credit hours to be considered. Transfer credits are only accepted from accredited institutions/universities. In addition, a grade equivalent of 2.5 or above is required for each course transferred from outside Cornell. The Director reviews all transfer requests and reserves the right to accept or reject any credits.
2.7 Grade Requirements

The College requires a minimum grade point average of 2.5 for graduation from the Master of Engineering program. Students admitted on a Provisional Basis must achieve a 3.0 average during their first term in the M.Eng. program to continue in the second term. Typical graduate student grade point averages are much higher than this. At Cornell, decimal grade points are assigned to grades with (+) or (-), i.e., A+ = 4.3, A = 4, A- = 3.7, B+ = 3.3, etc. A grade of less than C- in a course will result in no credit being granted toward satisfaction of the 30-credit hour minimum requirement. However, these courses are included in calculating grade point averages.

2.8 Office Space and Building Access

Engineering Management students have space allocated in 410 and 420 Hollister Hall. This space includes:
- Individual study carrels (first come first serve on a daily basis),
- Group study areas,
- Sixteen computer workstations (first come first serve on a daily basis),
- Storage areas above study carrels and computer workstations (first come first serve on a daily basis)
- Laptop charging table, and
- Printers (available via wireless access from your laptops or directly from the workstations).

We do not recommend leaving valuable items unattended in the lockers or storage space above the workstations.

Your Cornell ID card will open the outside doors to Hollister Hall when they are electronically locked, as well as the door to 404 Hollister Hall, and the door to 351 Hollister Hall which is the graduate student lounge.

2.9 Career Services

We are confident that the background you receive in your M.Eng. program in Engineering Management will prepare you for your job search and lead to new career opportunities. The following five career pathways with example companies are most common among our recent graduates and do not reflect all of the potential successful career pathways from our graduates.

| Consulting and Finance | • Goldman Sachs, Accenture, Deloitte, Amazon, Google |
| Data Analyst/Business Analyst | • DIA Associates, Capitol One, ZS Associates, Amazon, Google |
| Engineering Leadership Development/Rotational Program | • Northrop Grumman, GE |
| Tech: Product Manager, Entrepreneur | • Wayfair, Intel, Microsoft |
| Real Estate and Construction Management | • Skanska, Clark Construction |

Advisors, faculty, and staff are available to discuss your career goals and assist you. During the Professional and Leadership Development Seminar, students work with faculty and advisors to prepare for their career search. There are also other opportunities, workshops, and resources available on campus.
The College of Engineering also supports career development for M.Eng. students. To discuss job search strategies, networking, job offer negotiations, or other general career questions, please visit their office in 201 Carpenter Hall or review resources on their website.

2.10 Transferring from On-Campus to Online Learning

Students who wish to transfer from the On-Campus program to the Online Learning program must complete at least one semester as an On-Campus student. It is best to discuss this option with your advisor as soon as possible and final approval will be granted by the Director. Please note that the Online Learning program is a part-time, two-year program.

A general petition must be submitted to switch between programs. If approved, you will receive an updated acceptance letter which will include a new expected graduation date. The change will also be reflected in your bursar account. Tuition for the Online Learning program is charged per credit hour whereas tuition for the On-Campus program is charged per semester.

Students can only make this change one time and cannot switch back to the On-Campus program once they have enrolled in the Online Learning program.

SECTION 3 - PROFESSIONAL CONDUCT and SPECIAL NEEDS

3.1 Academic Integrity and Plagiarism

Absolute integrity is expected of every Cornell student in all academic undertakings. Integrity entails a firm adherence to values most essential to an academic community, including honesty with respect to the intellectual efforts of oneself and others. Both students and faculty at Cornell assume the responsibility of maintaining and furthering these values. A Cornell student’s submission of work for academic credit indicates that the work is their own. All outside assistance should be acknowledged, and the student’s academic position should always be reported truthfully. In addition, Cornell students have the right to expect academic integrity from each of their peers. It is plagiarism for anyone to represent another’s work as their own. As stated in the University Code of Academic Integrity, “The maintenance of an atmosphere of academic honor...is the responsibility of the student and faculty...”.

Gray areas sometimes exist when students study and work together. It is important that faculty make clear what is expected and that students understand what authorship citations an instructor expects. To become better acquainted with academic integrity responsibilities, each student should have a copy of the Policy Notebook for Students, Faculty, and Staff (available in the Dean of Students’ Office). Also, a copy of the “University Code of Academic Integrity” is included in the Handbook of Engineering Students, available from the College of Engineering’s Office of Admissions and Undergraduate Programs, located near the north entrance of Hollister Hall, or online at http://cuinfo.cornell.edu/aic.cfm.

3.2 Student Disability Services

Cornell University is committed to assisting those who have special needs. Please consider registering with SDS if you require an accommodation. Also, a brochure describing services for persons with disabilities may be obtained from the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801.
APPENDICES

A Engineering Management Program Faculty and Their Interests

Ricardo A. Daziano, Assistant Professor (Ph.D. Université Laval): pro-environmental preferences, sustainable travel behavior, renewable energy, environmentally friendly energy sources.

Andrea Ippolito, Lecturer (M.S. Massachusetts Institute of Technology): engineering management, entrepreneurship, innovation, product management, healthcare systems.

Jacob P. Mays, Assistant Professor (Ph.D. Northwestern University): applications of optimization and statistical learning in energy systems, design and analysis of electricity markets.

Robert Newman, Senior Lecturer (MBA Baker College): engineering management, business development, organizational and team development, emotional intelligence, entrepreneurship.

Linda K. Nozick, Professor (Ph.D. University of Pennsylvania): systems engineering, transportation and logistics, engineering management.

Patrick M. Reed, Professor (Ph.D. University of Illinois): environmental and water resources systems, multi-objective planning and management, evolutionary computation, high-performance computing, decision making under uncertainty.

Samitha Samaranayake, Assistant Professor (Ph.D. University of California, Berkeley): systems engineering, transportation

Dirk Swart, Lecturer (M.A. Tufts University): embedded systems, engineering management, project management, product management, asymmetric negotiations, entrepreneurship.

Francis M. Vanek, Senior Lecturer (Ph.D. University of Pennsylvania): energy, environment, transportation.
B Five Semester M.Eng./MBA Program

What is it?

A joint venture between the College of Engineering and the Johnson Graduate School of Management (JGSM) that allows students to acquire a Master of Engineering degree and an MBA degree in five (5) semesters (usually based on Fall admission to the M.Eng. program). The dual-degree program consists of 75 credit hours, 30 of which comprise the regular two-semester M.Eng. program. For those admitted to the MBA program, the JGSM allows some (occasionally all) of these M.Eng. credits to be transferred to the MBA program, usually resulting in saving one semester’s time over taking the M.Eng. and MBA degree programs separately.

What are the requirements?

Applicants must have already earned a baccalaureate degree in engineering, applied science, or equivalent from Cornell or elsewhere and be accepted for admission or presently enrolled in the M.Eng. program. The two programs require separate application forms and review processes, and materials submitted to one program are not available to the other. JGSM places great emphasis on relevant work experience, and this will be taken into consideration when evaluating applications. All requirements of the Master of Engineering program are to be completed. No credit toward the M.Eng. degree is allowed for coursework done outside Cornell. All requirements of the Master of Business Administration curriculum are to be completed. Coursework done outside Cornell normally will not be credited toward the MBA degree.

Please review the following steps if you are interested in this program, (the following dates are based on Fall enrollment):

1. If you have been admitted to or are attending the M.Eng. program, formally apply to the Johnson Graduate School of Management by the second semester of your M.Eng. program at the latest. You must fill out a separate JGSM application form and pay their application fee. You should also notify your M.Eng. advisor of your intention to do the MBA program so your advisor can take this into consideration when planning your M.Eng. program schedule.

2. If you have not already done so, apply to take the GMAT (or GRE) which is required by JGSM. January of your M.Eng. year is your last possible test date. Have the scores directed to JGSM.

3. If you are admitted to JGSM, your Master of Engineering degree will be awarded when all requirements of that degree are completed (usually after two semesters), and the Master of Business Administration degree will be awarded when all requirements of that degree are completed (usually after 3 more semesters). The two degrees cannot be awarded simultaneously.

In general, financial aid is not awarded to those doing the MBA portion of the program except through the Knight Joint Degree Scholarship Program, which has very strict requirements. Information and an application to the Scholarship Program is available on the web at https://www.engineering.cornell.edu/admissions/graduate-admissions/admissions-meng-students/knight-scholarship-program. Questions about this scholarship should be directed to the Office of Research and Graduate Studies (engr_grad@cornell.edu).
C Masters in Public Administration (M.P.A.) from the Cornell Institute for Public Affairs

After the award of the M.Eng. degree, Engineering Management students who aspire to a leadership or management position in formulating, implementing or evaluating public policies can benefit from a program that offers an accelerated path to a Masters in Public Administration (M.P.A.) from the Cornell Institute for Public Affairs (CIPA). CIPA offers a flexible and challenging two-year program of graduate professional studies in public affairs that prepares degree recipients for careers in public affairs, public administration, and public policy.

Concentration areas offered in CIPA include Environmental Policy; Science, Technology and Infrastructure Policy; Economic and Financial Policy; International Development; and Public and Nonprofit Management.

The two degree programs (M.Eng. and M.P.A.) have separate admission processes; so you may apply to the accelerated M.P.A. program upon completion of your first semester in the M.Eng program. Those who possess an M.Eng. can obtain the M.P.A. degree in three additional semesters. Applicants should plan on meeting with the CIPA Director of Graduate Studies to discuss which M.Eng credits would be transferable for the MPA program.

Please contact the CIPA Office at 607-255-8018 or cipa@cornell.edu to set up an appointment. More information is available on the CIPA website.
D  Prerequisite Skills in Probability and Statistics

Engineering Management requires that an engineer deal with variation, variability and uncertainty. Illustrative issues of concern include estimates of the time to complete tasks in project planning and scheduling; the prices for goods and services; the demand for goods and services; and the performance of a range of systems and other forces that effect an organization. Therefore, Engineering Management students need to know how to use the language of probability to describe variability and uncertainty, and to help resolve the challenges faced by their organization. They need to understand how statistical concepts help them resolve what information can be extracted from available data, and how to determine and describe the precision of estimated quantities.

Our Engineering Management courses provide examples of these issues and reinforce and advance these skills. We depend upon all the Engineering Management students to begin the program with a basic understanding of probability and statistics, consistent with what would be included in an undergraduate treatment of the subject. Specific concepts and ideas students should have when entering the program include the basic concepts and methods of probability, along with an understanding of the idea of statistical estimation, construction of confidence intervals, hypothesis testing, and linear regression analysis. If the student does not complete a course with this material prior to entering, they will be required to take a course while in the program. This course will require additional course work beyond the 30 credit hours required and may delay completion of the program.

As a refresher, we recommend the following open online courses and resources:

- MIT Open Statistics Course, and/or
- Khan Academy Statistics Background Material.

Essential concepts and brief descriptions are also provided below. [For clarification we provide references to sections in Jay L. Devore, *Probability and Statistics for Engineering and the Sciences*, 9th edition, Duxbury, Belmont, CA, 2015. See also http://allpsych.com/stats/index.html]

1. Students should know the 3 *basic axioms for probability*. [Devore §2.1-2.2]
   \{ P(A) ≥ 0; P(S) = 1; for A and B disjoint, P[A ∪ B] = P[A] + P[B] \}

2. Students should know how to *calculate the probability* of events consisting of unions [A ∪ B ], intersections [ A ∩ B ], and complements [A’ = S – A ], of events of known probability. They should be able to use the Total Probability Theorem and Bayes Theorem to calculate probabilities and conditional probabilities of different events [P(A|B) = P(A ∩ B)/P(B) ]. [Devore §2.2-2.5]

3. Students should know definitions of the cumulative distribution function (cdf) Fx(x) and probability density function (pdf) f_{x}(x) for continuous univariate random variables; the properties of each; and how to use these functions to calculate the probabilities for events such as P{ a ≤ X ≤ b }. [Devore §4.1-4.2]

4. Students should know the definitions and properties of the mean \( \mu \), variance \( \sigma^2 \), and correlations \( r \); how to compute the univariate “moments” given a pdf; and how to compute the mean and variance for linear functions and linear combinations of random variables. [Devore §5.1-5.2, 5.5]

5. Students should know the some properties of a *Normal distribution*, the form of the pdf, and how to calculate quantiles and the probability of events such as \( a ≤ X ≤ b \) for \( X \sim N [ \mu , \sigma^2 ] \). Students should be able to state the *Central Limit Theorem* and know when it applies. [Devore §4.3, 5.4]

6. Students should know the mean, variance and probability mass function for the discrete binomial and the Poisson distributions, and be able to use those relationships to compute probabilities for a range of events. [Devore §3.1-3.4, 3.6]
7. Students should know the concept of an estimator, and the sampling properties of the sample mean $\bar{X}$ for a set of data. [Devore §5.4, 6.1-6.2]

8. Students should know how to construct confidence intervals for the mean of a Normal distribution with small samples. [Devore §7.1-7.3]

9. Students know how to structure a statistical decision problem as a choice between two hypotheses and how that choice relates to probabilities of type I (denoted $H_0$) and II (denoted $H_1$) errors; students should know how to perform a simple one-sample or two-sample t test. [Devore §8.1-8.2]

10. Students should know why statisticians sometimes summarize results by a P-value, as well as what a P-value is, and how to calculate it. [Devore §8.4]

11. Students should understand the form of and assumptions employed with the basic linear model $Y = \beta_0 + \beta_1 x + \epsilon$, with independent additive normal errors $\epsilon$. [Devore §12.1]

12. Students should be able to calculate least-squares estimators of the two coefficients $\beta_0$ and $\beta_1$, and construct hypothesis tests on the parameters. Students should know the definition of $R^2$, what it represents, and how to calculate it. Students should know the definition and meaning of the correlation coefficient, and be able to calculate its estimator $r$. [Devore §12.2-12.5]
Program Requirements, Link to Proposal Form, and Track Specialization Electives

Required Courses:

ENMGT 5900 – Project Management (Fall or Spring, 4 credits)
ENMGT 5910* – Engineering Management Project (Fall or Spring, 4 credits)
ENMGT 5930 – Data Analytics (Fall, 4 credits)
ENMGT 5940 – Economics and Finance for Engineering Management (Spring, 4 credits)
ENMGT 5980 – Decision Framing and Analytics (Fall, 3 credits)
ENMGT 6090 – Professional and Leadership Development Seminar (Fall, 1 credit, non-graded)
ENMGT 6091 – Seminar: Project Management (Spring, 1 credit, non-graded)

*ENMGT 5910 may only be taken in the second semester of your program (or third semester for students admitted prior to Spring 2023 who opt for a three-semester program).

You must complete the Proposal Form here for advisor, and subsequent Director’s approvals. Please note that any changes made to your proposal form must be approved by your advisor along with submission of an updated copy of your proposal form.

A three-credit organizational behavioral course is required. You cannot take a half-semester course (e.g., 1.5- or 2-credit) to meet this requirement, as is permitted for the Track Specialization requirements.

Recommended Individual and/or Organizational Behavior courses include ENMGT 5960 – Negotiations and Contracts for Engineering Managers; ENMGT 6095 – Contemporary Challenges for Engineering Managers; ENMGT 6020 – Managing a Culture of Innovation; NCC 5530 – Marketing Management; NCC 5540 – Management and Leading in Organizations; NBA 6630 – Managerial Decision Making; or ILROB 5200 – Organizational Behavior and Analysis; other courses are also possible.

The information provided here should help you make decisions, but we encourage you to seek guidance from your advisor and other faculty members. An important aspect of the program is interaction between each student and his/her faculty advisor. Your advisor will work with you to develop a program consistent with your career goals and the intent of the M.Eng. program.

Suggested alternatives are:

- AEM 5110 – Design and Innovation
- HADM 6110 - Negotiations in the Hospitality Industry
- HADM 6130 – Entrepreneurial Management
- ILROB 5200 - Organizational Behavior and Analysis (Note: Must be admitted in person by professor)
- NBA 5150 - Leadership Theory and Practice (Note: This is an intensive, 1-week course that meets before the semester starts, so if you choose to take it you would need to make travel plans accordingly. We highly recommend you take it in the Fall semester because the Spring semester typically is very popular and has a wait list).
- NBA 6090 - Digital Marketing
- NBA 6200 - Marketing Research
- NBA 6540 - Power and Politics in Organizations (Note: You must take both the first and second seven week sections of this course to meet the 3-credit requirement)
- NBA 6620 - Product Marketing Insights
- NBA 6630 - Managerial Decision Making
- NCC 5530 - Marketing Management
- NCC 5540 - Management and Organizations
9-credits in Engineering Management Track Specialization elective courses are required.

Each student’s program must include at least 9-credits worth of electives selected to provide a track area of specialization. Students can combine two 1.5 or higher credit courses, as long as they meet or exceed 3 credits. These electives must be taken for a grade (they cannot be taken S/U). We have put together seven track areas of specialization below tied to common career paths of Engineering Management degree graduates. Any 5000 or 6000-level College of Engineering, non-seminar technical 3 credits or higher course is acceptable. Courses outside of the College of Engineering and not listed below must be approved by the Director of the Engineering Management program via a general petition. The course petition must include a detailed syllabus of the technical content to be covered. Students are also welcome to mix and match courses from different headings or choose courses aligned with their own interests to best serve their professional goals.

Track Specializations:
- “Build your own” track
- Consulting
- Analytics
- Entrepreneurship and Product Management
- Engineering Leadership
- Real Estate and Construction Management
- Sustainability and Renewable Energy
- Infrastructure Policy in a Changing World

You will need to get your specialization track and classes approved by your faculty advisor.

Some additional things to think about when selecting your specialization track electives:

1. Make sure to review the Course Roster because it is regularly updated.
2. Make sure to check the prerequisites. If you don’t have the prerequisites, you will need to email the instructor to get permission. Also, feel welcome to attend the first day of classes too (along with emailing them prior).
3. Many JGSM courses are 1.5 credits, which allows you to take more, but make sure that you meet the requirement of 9 credits worth of specialization electives.
4. Make sure to double check when courses are offered because many courses are only offered in the Fall or Spring, but not both.
5. For your specialization electives, courses should be above the 5000 level, which means that they are at the graduate level.
6. You can mix and match across track specializations or build your own track

The breakdown of the pre-approved electives for each track are below. Please note that course offerings change from semester to semester. All courses listed are 3 credits unless otherwise noted.

Consulting

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 6640</td>
<td>Microeconomics of Discrete Choice</td>
</tr>
<tr>
<td>ENMGT 5960</td>
<td>Negotiations and Contracts for Engineering Management</td>
</tr>
<tr>
<td>ENMGT 5980</td>
<td>Decision Framing and Analytics <em>(If not used as a core course)</em></td>
</tr>
<tr>
<td>NBA 5000</td>
<td>Intermediate Accounting</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>NBA 5020</td>
<td>Managerial Accounting and Reporting</td>
</tr>
<tr>
<td>NBA 5061</td>
<td>Comprehensive Financial Statement Analysis</td>
</tr>
<tr>
<td>NBA 5090</td>
<td>Advanced Financial Statement Analysis (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5110</td>
<td>Financial Modeling (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5120</td>
<td>Applied Portfolio Management</td>
</tr>
<tr>
<td>NBA 5130</td>
<td>International Finance Cases (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5140</td>
<td>Ethics and Corporate Culture (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5200</td>
<td>Retail Operations (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5245</td>
<td>Introduction to Macroeconomics</td>
</tr>
<tr>
<td>NBA 5270</td>
<td>Applied Economic Analysis</td>
</tr>
<tr>
<td>NBA 5305</td>
<td>Entrepreneurial Finance: Valuation and Term Sheet Design (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5420</td>
<td>Investment and Portfolio Management</td>
</tr>
<tr>
<td>NBA 5260</td>
<td>Leaders in Emerging Markets (1 credit)</td>
</tr>
<tr>
<td>NBA 5360</td>
<td>Investment Banking Essentials (1.5 credits)</td>
</tr>
<tr>
<td>NBA 5550</td>
<td>Fixed Income Securities and Interest Rate Options</td>
</tr>
<tr>
<td>NBA 5911</td>
<td>Risk Management in Emerging Markets</td>
</tr>
<tr>
<td>NBA 5980</td>
<td>Behavioral Finance (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6090</td>
<td>Digital Marketing (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6200</td>
<td>Marketing Research</td>
</tr>
<tr>
<td>NBA 6220</td>
<td>Marketing Strategy (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6250</td>
<td>International Marketing (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6390</td>
<td>Data-Driven Marketing (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6430</td>
<td>Managerial Spreadsheet Modeling (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6560</td>
<td>Valuation Principles (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6630</td>
<td>Managerial Decision Making</td>
</tr>
<tr>
<td>NBA 6650</td>
<td>The Strategic Management of Technology and Innovation</td>
</tr>
<tr>
<td>NBA 6730</td>
<td>Derivatives Securities Part I (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6740</td>
<td>Derivatives Securities Part II (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6780</td>
<td>Advanced Private Equity - Negotiations and Structuring (2 credits)</td>
</tr>
<tr>
<td>NBA 6410</td>
<td>Supply Chain Strategy</td>
</tr>
<tr>
<td>NBA 6820</td>
<td>Negotiation 1: Negotiation Essentials (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6880</td>
<td>Financial Distress, Bankruptcy and Restructuring (1.5 credits)</td>
</tr>
<tr>
<td>NBA 6930</td>
<td>Strategy and Tactics of Pricing (1.5 credits)</td>
</tr>
<tr>
<td>NCC 5000</td>
<td>Financial Accounting (2.5 credits) if not used for finance requirement</td>
</tr>
<tr>
<td>NCC 5530</td>
<td>Marketing Management</td>
</tr>
<tr>
<td>NCC 5560</td>
<td>Managerial Finance if not used for finance requirement</td>
</tr>
<tr>
<td>NCC 5580</td>
<td>Managing Operations</td>
</tr>
<tr>
<td>PADM 5755</td>
<td>Infrastructure financing</td>
</tr>
</tbody>
</table>

**Entrepreneurship and Product Management**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEM 6385</td>
<td>Entrepreneurial Strategy for Technology Ventures (1.5 credits)</td>
<td></td>
</tr>
<tr>
<td>AEM 6395</td>
<td>Technology Strategy (1.5 credits)</td>
<td></td>
</tr>
<tr>
<td>ENMG 5070</td>
<td>Entrepreneurship for Engineers and Scientists</td>
<td></td>
</tr>
<tr>
<td>ENMG 5920</td>
<td>Product Management</td>
<td></td>
</tr>
<tr>
<td>ENMG 5960</td>
<td>Negotiations and Contracts for Engineering Management</td>
<td></td>
</tr>
<tr>
<td>HADM 6130</td>
<td>Entrepreneurial Management</td>
<td></td>
</tr>
<tr>
<td>HADM 6211</td>
<td>Entrepreneurial Finance</td>
<td></td>
</tr>
<tr>
<td>HADM 6800</td>
<td>Law for Entrepreneurs</td>
<td></td>
</tr>
<tr>
<td>LAW 6335</td>
<td>Emerging Growth Companies and Venture Capital Financing: Principles and Practice (2 credits)</td>
<td></td>
</tr>
</tbody>
</table>

Page | 20
NBA 5100 Social Entrepreneurship (1.5 credits)
NBA 5180 Intro to Design and Innovation (1.5 credits)
NBA 5305 Entrepreneurial Finance: Valuation and Term Sheet Design (1.5 credits)
NBA 5590 The Venture Capital Industry and Private Equity Markets (.5 credit)
NBA 5630 The IPO and Mergers and Acquisitions Process
NBA 6029 Leading Agile Innovation (1.5 credits)
NBA 6090 Digital Marketing (1.5 credits)
NBA 6230 Actualizing Your Startup – Part 1 (1.5 credits)
NBA 6390 Data-Driven Marketing (1.5 credits)
NBA 6560 Valuation Principles (1.5 credits)
NBA 6570 Entrepreneurial Marketing (1.5 credits)
NBA 6620 Brand Management (1.5 credits)
NBA 6650 The Strategic Management of Technology and Innovation
NBA 6820 Negotiation 1: Negotiation Essentials (1.5 credits)
NBA 6930 Strategy and Tactics of Pricing (1.5 credits)
NCC 5530 Marketing Management

**Real Estate and Construction Management**

CEE 5950 Construction Planning and Operations
CEE 6730 Design of Concrete Structures (4 credits)
CRP 5320 Real Estate Development Process I (1.5 credits) *(must take part II)*
CRP 5321 Real Estate Development Process II (1.5 credits) *(must take part I first)*
CRP 5560 Creating the Built Environment (1.5 credits)
CRP 5530 Land Use and Spatial Planning Mode
CRP 5590 Legal Aspects of Land Use Planning (4 credits)
ENMG 5960 Negotiations and Contracts for Engineering Management
HADM 6200 Principles of Real Estate
HADM 6211 Entrepreneurial Finance
HADM 6280 Real Estate Finance and Investments
HADM 6500 Sustainable Development (4 credits)
HADM 6570 Project Management for Hospitality Real Estate Development
HADM 6580 Advanced Project Management for Real Estate Development (4 credits)
PADM 5755 Infrastructure Financing
SYSEN 5740 Design Thinking for Complex Systems (2 credits)

**Engineering Leadership**

*General*

ENMG 5960 Negotiations and Contracts for Engineering Managers
ENMG 5990 Contemporary Challenges for Engineering Managers
ENMG 6020 Managing a Culture of Innovation
HADM 6155 Women in Leadership (2 credits)
HADM 6835 Leading and Managing Teams
ILRHR 7451 Leadership Assessment for Managers (1.5 credits)
NBA 5150 Leadership Theory and Practice (take in Fall)
NBA 6410 Supply Chain Strategy (1.5 credits)
NBA 6630 Managerial Decision Making
NBA 6650 The Strategic Management of Technology and Innovation
NBA 6700 Leadership, Ethics and Organizations (1.5 credits)
NBA 6820  Negotiation 1: Negotiation Essentials (1.5 credits)
NCC 5580  Managing Operations
ORIE 5100  Manufacturing Systems Design: A Consulting Boot Camp (4 credits)
ORIE 5122  Inventory Management (4 credits)
ORIE 5140  Model Based Systems Engineering (4 credits)
ORIE 5300  Optimization I (4 credits)
ORIE 5380  Optimization Methods
ORIE 5580  Simulation Modeling and Analysis (4 credits)
ORIE 5581  Monte Carlo Simulation (2 credits)
ORIE 6741  Bayesian Machine Learning

Healthcare/Biomedical

BME 5310  Machine Learning with Biomedical Data
BME 5390  Circuits, Signals, and Sensors: Instrumentation Laboratory (4 credits)
BME 6210  Engineering Principles for Drug Delivery
BME 6650  Principles of Tissue Engineering
BME 7310  Advanced Biomedical Engineering Analysis of Biological Systems

Analytics

This is a popular track for those interested in supply chain management.

CEE 6000  Numerical Techniques for Engineers
CEE 6620  Analysis and Control of Transportation Systems and Networks
CRP 5080  Introduction to Geographic Information Systems for Planners (4 credits)
CS 5320  Introduction to Database Systems
CS 5150  Software Engineering (4 credits)
CS 5320  Introduction to Database Systems
CS 5780  Introduction to Machine Learning (4 credits)
ENMGT 5980  Decision Framing and Analytics (if not used as a core course)
FDSC 4210  Food Engineering Principles (4 credits) (popular course for students interested in Food Product Supply Chain Management)
INFO 5306  Crowdsourcing and Human Computation (4 credits)
INFO 6113  Technology and Law Colloquium
INFO 6120  Ubiquitous Computing
INFO 6220  Networks II: Market Design
INFO 6260  Networks, Crowds, and Markets: Foundations for Formal Analysis and Design
INFO 6420  Re-Designing Robots
MAE 4780  Feedback Control Systems (4 credits)
NBA 5301  Intermediate Design and Programming for Web
NBA 6010  Electronic Commerce/Electronic Business
NBA 6340  Customer Strategy and Analytics (1.5 credits)
NBA 6390  Data-Driven Marketing (1.5 credits)
NBA 6410  Supply Chain Management (1.5 credits)
NBA 6430  Managerial Spreadsheet Modeling (1.5 credits)
NBA 6550  Introduction to SQL and Tableau (1.5 credits)
NBA 6920  Machine Learning Applications in Business (1.5 credits)
NCC 5530  Marketing Management
NCC 5580  Managing Operations
ORIE 5100  Manufacturing Systems Design: A Consulting Boot Camp (4 credits)
ORIE 5122  Inventory Management (4 credits)
ORIE 5126  Principles of Supply Chain Management (4 credits)
SYSEN 5200  Systems Analysis Behavior and Optimization
SYSEN 5220  Systems Dynamics
SYSEN 5240  Search and Optimization with Metaheuristics
SYSEN 5300  Systems Engineering and Six Sigma for the Design and Operation of Reliable Systems (3-4 credits)
SYSEN 5400  Theory and Practice of Systems Architecture
SYSEN 5500  Systems Modeling Language: Fundamentals and Practice
SYSEN 5740  Design Thinking for Complex Systems (2 credits)
SYSEN 5940  Creativity and Innovation within Systems Engineering (1 credit)
SYSEN 6410  Multiobjective Systems Engineering Under Uncertainty
SYSEN 6880  Industrial Big Data Analytics and Machine Learning (4 credits)

Sustainability and Renewable Energy
CEE 6210  Renewable Energy Systems
CEE 6530  Water Chemistry for Environmental Engineering
CEE 6550  Transport, Mixing, and Transformation in the Environment
CEE 6560  Physical and Chemical Processes
CEE 6570  Biological Processes
CEE 6648  Sustainable Transportation Systems Design
CEE 6930  Public Systems Modeling
CEE 6200  Water Resource Systems Engineering
ChemE 6610  Air Pollution Control
ChemE 6640  Energy Economics
ChemE 6650  Energy Engineering
ChemE 6660  Analysis of Sustainable Energy Systems (2 credits)
MAE 5010  Future Energy Systems
MAE 5020  Wind Power
MAE 5430  Combustion processes
MSE 5150  Structures and Materials for Sustainable Energy Systems
MSE 5330  Materials for Energy Production, Storage, and Conversion

Infrastructure in a Changing World
PADM 5755  Infrastructure Financing (3 credits)
PAM 5340  Regulation and Infrastructure Policy (3 credits)

Plus at least 3 credits from the following:
CEE 5735  Mathematical Modeling of Natural and Engineering Systems
CEE 5950  Construction Planning and Operations
CEE 6210  Renewable Energy Systems
CEE 6620  Analysis and Control of Transportation Systems and Networks
CEE 6648  Sustainable Transportation Systems Design
CEE 6770  Natural Hazards, Reliability, and Insurance
CEE 6800  Engineering Smart Cities
CEE 6930  Public Systems Modeling (4 credits)
CRP 5560  Creating the Built Environment (1.5 credits)
CRP 5530  Land Use Planning Methods
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP 5590</td>
<td>Legal Aspects of Land Use Planning Methods (4 credits)</td>
</tr>
<tr>
<td>ENMGT 5980</td>
<td>Decision Framing and Analytics <em>(if not used as a core course)</em></td>
</tr>
<tr>
<td>HADM 6500</td>
<td>Sustainable Development (4 credits)</td>
</tr>
<tr>
<td>MAE 5010</td>
<td>Future Energy Systems</td>
</tr>
<tr>
<td>NCC 5580</td>
<td>Managing Operations</td>
</tr>
<tr>
<td>PADM 5757</td>
<td>Infrastructure Project Management and Finance Practicum (.5-1.5 credits)</td>
</tr>
<tr>
<td>SYSEN 5740</td>
<td>Design Thinking for Complex Systems (1.5 credits)</td>
</tr>
</tbody>
</table>
Courses of study for ENMGT 59XX series and other key courses

**ENMGT 5900: Project Management**
Fall and Spring, 4 credits

Prerequisite: permission of instructor.

Core graduate course in project management for people who will manage technical or engineering projects. Focuses both on the “technical” tools of project management (e.g., methods for planning, scheduling, and control) and the “human” side (e.g., forming a project team, managing performance, resolving conflicts), with somewhat greater emphasis on the latter.

**ENMGT 5910: Engineering Management Project**
Fall and Spring, 4 credits

Prerequisite: permission of instructor.

As Engineering Managers, you need to embrace both technical and business skills to tackle complex, sociotechnical challenges, while staying on top of the current pace of technological change. In this Engineering Management project course, we are bridging from your coursework to your role as an engineering manager. To get there, you will practice the tools, themes, and techniques learned in your Engineering Management coursework through the scaffolding of a large project. In ENMGT 5910, you will work in teams to participate in a project in collaboration with an industry partner. You will perform an intensive evaluation of some mixture of the technological and management aspects of a major engineering project or system, conducted with a team of students. This project typically incorporates some combination of economic and financial analysis, integration of components into a large-scale system, or technology feasibility.

**ENMGT 5920: Product Management**
Spring, 3 credits

Product Management is one of the fastest growing careers in engineering and technology-based industries. In this course, you will learn the foundations of product management including (i) preparing for success as a product manager, (ii) identifying and targeting customer needs, (iii) prioritizing your project needs, and (iv) designing, developing, and deploying your product across the product life cycle. Using skills developed through course lectures and discussions, you will complete a project where you will practice the sprint model utilized in most product teams. This course is for students interested in pursuing a career as a product manager in engineering or technology-based companies, learning about the product management competency, or working in a non-traditional tech setting to apply these skills on complex systems.

**ENMGT 5930: Data Analytics**
Fall, 4 credits

Prerequisites: CEE 3040 or equivalent.

Methods for managing data and transforming data into information. Modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in project design, scheduling, operations, forecasting, and resource allocation.

**ENMGT 5940: Economics and Finance for Engineering Management**
Spring, 4 credits

An engineering case-based exploration of economic models and methods used in analysis, comparisons, and decision making by engineers and engineering teams. Emphasis will be placed not only on the important
calculations, but also on understanding, communicating, and recording their findings, related assumptions, risks, external considerations and situational awareness.

**ENMGT 5960: Negotiations and Contracts for Engineering Managers**  
Fall, 3 credits

An exploration of negotiation types, skills, and tactics relevant to engineers and engineering managers, and a study in contract types, details, and clauses common to engineering fields. Studies will include human factors and behavior in negotiations, understanding and managing the end game, and legal terminology engineers should know.

**ENMGT 5980: Decision Framing and Analytics**  
Fall, 3 credits

Prerequisite: introduction to probability and statistics course such as CEE 3040, ENGRD 2700, ILRST 2100, BTRY 3010, or AEM 2100. Enrollment is limited to seniors and graduate students; or permission of instructor.

Framework to structure the way we think about decision situations that are complicated by uncertainty, complexity, and competing objectives. Specific decision analysis concepts and tools, such as decision trees, sensitivity analysis, value of information, and utility theory. Applications to all areas of engineering and life. Includes a group project to analyze a real-world decision.

**ENMGT 5990 (formerly ENMGT 6095): Contemporary Challenges for Engineering Managers**  
Fall, 3 credits

This course will focus on major modern challenges faced by Engineering Managers, and how our responses are guided and confined by our value systems, external pressures, and available resources. Topics covered will be of a contemporary nature looking at the factors that have affected managers in the recent five years, and that will affect us in the next five to ten years. Key areas will include Climate Change, Sustainability, Diversity, Remote work forces, Technology Strategy, Data Privacy, Ethics in Global Engineering, and others.

**ENMGT 6020: Managing a Culture of Innovation**  
Fall, 3 credits

Innovation is not just ideas, but getting ideas to measurable impact for your customers or employees. While the word ‘innovation’ is pervasive throughout engineering and business, developing and managing a culture of innovation has only been mastered by a few organizations. In fact, no company has remained on the Dow Jones Industrial Average since its inception. Why? Because implementing a culture of innovation is very difficult and is moored by a lack of understanding of proven innovation strategies, competencies, and tools. In this course, you will learn a systematic approach for developing and managing a culture of innovation. You will learn how to develop an innovation strategy to better meet your organization’s goals and customer needs. In addition, we will take time to dive into innovation competencies, such as design thinking, lean start-up, and making, along with learn several innovation tools including hackathons, open innovation strategies to deliver impact for your customers and organization.

**ENMGT 6090: Professional and Leadership Development Seminar**  
Fall, 1 credit *(not counted towards 30 credit program requirements)*

In the Professional and Leadership Development Course, Engineering Management Master of Engineering students will identify the goals for their career and engage in several career development support services, such as networking, interviewing, resume and cover letter writing, and negotiation workshops. In addition, they will engage in a leadership development series to help them further build their engineering management and leadership competencies. Through a variety of tools, one-on-one coaching, workshops, events, and other
resources, this course will help students develop and practice critical career management skills, along with build their confidence to find a career opportunity best suited to their interests and needs.

**ENMGT 6091: Seminar: Project Management**
Spring, 1 credit *(not counted towards 30 credit program requirements)*

Weekly seminar aimed at M.Eng. students, in particular those in the engineering management program. Weekly speaker will come from different engineering applications and discuss insights into project management.
G Professional Experience Program and Independent Study

Our Professional Experience Program provides real world training and work experience for select Engineering Management students by connecting them with industry including local start-up companies in the Praxis Center for Venture Development.

Alumni connections and cross-campus collaborations result in unique opportunities for students each year. This program takes place either over the summer or winter break during the school year. Students in the program will have the opportunity to build their resume while applying their Engineering Management skills to practice.

We host an information session for interested students and facilitate matching with companies seeking interns. Internships are flexible and for independent study credit.

Independent Study: CEE 6095

Students who would like to complete an independent study need to identify a faculty member to oversee the project and agree to provide continuing supervision of the work. An independent study can be for one, two, or three credits and does not count toward program requirements.

To submit an independent study request, work with the faculty advisor to come up with a 30 character or less subtitle that is unique to the project and will appear on your transcript. You must also create a syllabus with a list of deliverables and milestones. These requests are processed by the Undergraduate Coordinator in the School of Civil and Environmental Engineering and requests are due no later than the last day of the add period of the semester the study will take place.
H Johnson Immersion Programs

The Johnson Graduate School of Management offers several unique immersion programs. Each program is an intense, hands-on semester of integrated course and field work in a specific industry or career interest.

This is a selective opportunity with the majority of students joining the Semester in Strategic Operations. Students interested in any of the JGSM Immersion Programs should first talk to their advisor for more detailed information regarding the specific Immersion program you are interested in.

For those that are accepted into an Immersion program, ENMGT 5910 and ENMGT 6091 requirements are both waived as you will be in similar courses within the Immersion program.

Additional information is available on the Immersion Program website at https://www.johnson.cornell.edu/programs/full-time-mba/two-year-mba/curriculum/immersion-learning/.