# NEW JERSEY INSTITUTE OF TECHNOLOGY
# Department of Mechanical and Industrial Engineering

## Course Summary:

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| **COURSE:** | **IE 492 – 453, IE 492 – 455 – ENGINEERING MANAGEMENT** |
| **SEMESTER:** | FALL 2025 – ONLINE ONLY |
| **INSTRUCTOR:** | Ankush Karnik<br>BS. IE, MS. EM, MBA, CSSGB, PMP, CSM, SAFe POPM, EIT<br>Tel: (732) 893 0947<br>Email: Ankush.Karnik@njit.edu |
| **TEXTBOOKS:** | ▪ Project Management Institute, PMBOK Guide, 7th Edition, 2021.<br>▪ Sepulveda, J., Souder, W. and Gottfried, B., Schaum's Outline of Theory and Problems of Engineering Economics, McGraw-Hill, Inc., 1984<br><br>Note: You will also need to review additional sources – online or from the library in case the book falls short of thoroughly explaining a specific concept, or if you want to learn more about a specific topic.<br>An optional reference book that will serve as a good companion is Successful Project Management by Gido and Clements. The current edition is the seventh edition. But any prior editions will work. They should be available in the library. |
| **COURSE DESCRIPTION:** | This course covers the fundamental concepts of Engineering Economics and Project Management. It is designed to introduce engineering majors to the application of time value of money, and project management principles to general engineering problems and situations. The application of these principles helps facilitate decision-making in practice.<br><br>There are two parts to this course.<br><br>Engineering Economics section of the course will encompass the following topics: Interest Rates, Time Value of Money, Estimating Capital Projects, Economic Feasibility Analysis, Depreciation, and Decision Making.<br><br>The Project Management section of the course will cover all phases of the project life cycle, starting from Project Selection, and Initiation through Project Closeout. We will review various tools and methodologies that have enabled effective management of various aspects of the project. We will also touch on popular project management methodologies applicable to various projects, including engineering and technology projects. These concepts include Agile, Scrum, Kanban, etc. Finally, we will also learn about project KPIs, and metrics used to monitor project progress and success. Towards the end of the semester, we will also introduce application of |

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| | Artificial Intelligence to automate and streamline production of deliverables and with specific project manager duties.<br><br>To reinforce the concepts learned in class, we will have several assignments that may include problems/questions, mini-cases, and a term project.<br><br>For the project management section of the course, we will use PMBOK by PMI. This will help students study for Certified Associate in Project Management, or Project Management Professional certification exams in the future.<br><br>There will also be three quizzes and a final exam in this course.<br><br>It is expected that students will work in teams for the term project. **INDIVIDUAL PROJECTS ARE NOT PERMITTED IN THIS COURSE – NO EXCEPTIONS.** |
| **COURSE LEARNING OUTCOMES:** | ● Effectively apply knowledge of Engineering Management including Engineering Economics and Project Management in real-world situations.<br>● Identify, formulate, and solve engineering problems.<br>● Effectively function on multidisciplinary and virtual teams.<br>● Apply course learnings and modern – popular management tools to engineering practice. |
| **INSTRUCTIONAL METHODS:** | This section is a distance learning / online section, and therefore all course materials will be delivered through an online medium.<br><br>Canvas:<br>● Canvas is an online platform used by NJIT to facilitate the delivery of online lectures and materials.<br>● Accessed via canvas.njit.edu.<br>● PowerPoint slides, homework problems, video links, and other supporting materials will be uploaded for student review and download.<br>● Assignments will be posted on Canvas.<br>● Submissions will be via Canvas as well.<br>● Canvas will also serve as a tool for group collaborations and discussions related to all class assignments and projects.<br><br>Textbooks/Assigned Literature:<br>● There are two textbooks for this course. Both are required as one of the textbooks covers Engineering Economics and the other covers the Project Management section of this course.<br>● It is expected that the students will read and refer to assigned textbooks as we will be covering materials from the same. Homework |

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| | assignments will also be mostly from textbooks. Lecture materials make the best effort to explain the material, but students must read/refer to the assigned literature for detailed explanation and understanding of the topic.<br><br>Web Resources:<br>● Links to articles, videos, and other materials will be posted on Canvas. These links will help reinforce concepts learned in this course.<br><br>It is also expected that students review online resources and news to reinforce concepts learned in class. It is all about connecting theory to real-life situations! |
| **NJIT HONOR CODE:** | Please read and follow the NJIT University Code for Academic Integrity<br><br>Any violation of the code will null and void all assignments and grades for this course. The alleged action will be reported to the Dean of Students' office for further action. The NJIT Integrity and Honor Code site is provided below.<br><br>https://www.njit.edu/dos/sites/njit.edu.dos/files/AY25_26%20Code%20of%20Student%20Conduct_Interim%20Policy.pdf |
| **PERSONAL MATTERS & HEALTH ISSUES:** | The instructor should not be exposed to family matters, health, hospitalization, or other serious personal matters. Should a serious event happen, please communicate the issue directly and solely to the Dean of Students who will advise on how to proceed and provide next steps. |
| **ACADEMIC INTEGRITY:** | Since this is a distance learning / online course, all assignments, projects, and quizzes/exams can be completed from any location. It is expected that students will not collaborate while completing assignments, quizzes, or exams unless otherwise indicated. Please note that tools utilized for this online course allow the instructor to identify and determine if the students were collaborating.<br><br>Such instances and any occurrences of collaboration, when identified, are directly communicated to the department and the Dean of Students for further action.<br><br>*Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.*<br><br>*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found* |

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| | *in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"* |
| **GENERATIVE AI:** | *This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area unless otherwise mentioned. As such, AI usage is not permitted throughout this course under any circumstance.* |
| **ASSIGNMENTS:** | To gain maximum benefit from the course, there is a mix of individual and group assignments to be completed over the semester.<br><br>There will be assignments due each week. Typically, individual assignments will be due on Fridays, and group assignments will be due on Sundays.<br><br>Please make sure that the assignments are submitted via Canvas in a designated area on time every week.<br><br>**Assignments will NOT be accepted via email or any other medium. NO EXCEPTIONS!**<br><br>Please make sure you read the syllabus carefully and get to know the assignment's due dates. |
| **QUIZZES & EXAMS DELIVERY** | **Quizzes and Exams in this course will be administered online via Lockdown Browser**. The exam must be taken within the assigned time and date duration. The connection details for each quiz and exam will be posted on Canvas or sent via email as the date nears. Quizzes and Exams are typically open for multiple days to allow flexibility to students given other commitments. However, they must be taken in a single sitting once started. |
| **DELIVERABLE DUE DATES:** | All assignments' due dates are indicated in the 'Detailed Course Schedule' section in this document. Assignments must be received on Canvas by 11:55 pm on the day they are due. **It is recommended that you do not wait until the last minute for submission to avoid any technical issues etc.**<br><br>**Any assignment not received in Canvas by the due date/time will have a late penalty and 5% of assignment the grade will be automatically deducted for each day the assignment is late. Assignments will not be accepted via any other medium.**<br><br>**The last day to submit all assignments for this course is December 11, 2024, which is the last day of the class. No assignments will be accepted after December 11, 2025. Upload capability in Canvas will be disabled after this date.** |

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| **GRADING:** | Please see the Grading schedule mentioned in the 'Weighted Grades' section of this document.<br><br>This course will follow NJIT recommended grading schedule as follows:<br><br>A: for superior performance (90% or higher)<br>B+: for excellent performance (87% to 89.99%)<br>B: for very good performance (82% to 86.99%)<br>C+: for good performance (76% to 81.99%)<br>C: for acceptable performance (70% to 75.99%)<br>D: for minimum performance (65% to 69.99%)<br>F: otherwise / inadequate<br><br>**Grades will NOT be rounded to one significant digit or the next whole number for a higher grade.** |
| **SOFTWARE PROGRAMS:** | It is expected that the students will have access to Microsoft Excel, Microsoft Word, and Microsoft Project or similar throughout this course. The course contains several exercises that need to be completed in Microsoft Excel and Microsoft Project or similar. Furthermore, the final project for the course will require the use of these software applications as well. No other software is required for this course. Note that depending on your familiarity with Microsoft Excel, you may be able to use Microsoft Excel to create project plans for the term project. We will cover this in detail as we progress through the semester. The above software programs are available for download from NJIT IST. Download instructions for Microsoft Project will be posted on Canvas.<br><br>You may want to download Microsoft Project from NJIT IST website. https://ist.njit.edu/software. It is available for current students. Microsoft Project is available on Windows only. If you have an apple mac you will need to use Microsoft Excel or another spreadsheet application for project plan assignments.<br><br>**INSTRUCTIONS TO DOWNLOAD MICROSOFT PROJECT FROM NJIT:**<br><br>*Students can download and activate Microsoft Project from the Azure Student Dev Portal.*<br><br>*They can sign up to access the portal from this link if they have not done so already: http://azureforeducation.microsoft.com/devtools*<br><br>*Once they verify their information, they can navigate to the education section. There is a section for software where Microsoft Project should be available to them.*<br><br>*They can download the .iso and open it, running the setup installer. They* |

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| | *can enter their account's activation key provided in the Azure portal to activate the software once installed.* |
| **INSTRUCTOR AVAILABILITY:** | I will be available every day of the week. I will be checking emails regularly and will respond within 24 hours. I will also be available by phone if needed, but it is best to reach me via email first. However, feel free to call me if you do not hear from me within 24 hours, or if you have an urgent question.<br><br>There are days when I may be traveling for work and during those days, I may be slow in responding to emails or queries, however, it should not affect my availability or the class schedules overall. |
| **PEER EVALUATIONS:** | As in the corporate world, we will have peer evaluations in this course. You will be grading your group members at the end of the semester or various attributes. Peer evaluations may be counted towards the final grade for this course. This is typically known as 360-degree evaluation. Each student must submit a peer evaluation.<br><br>**PLEASE NOTE: SUBMISSION OF PEER EVALUATION IS CRUCIAL TO ENSURE ALL TEAM MEMBERS HAD EQUAL CONTRIBUTION IN COMPLETING THE TERM PROJECT. ALL TEAM MEMBERS MUST CARRY EQUAL WEIGHT IN THE TERM PROJECT. LATE SUBMISSIONS WILL NOT BE ACCEPTED. PLEASE SEE THE EVALUATION DUE DATE MENTIONED IN THE DETAILED COURSE SCHEDULE. THIS DATE MAY BE DIFFERENT THAN OTHER ASSIGNMENT DATES.** |
| **COURSE EVALUATIONS:** | Like other courses at NJIT, you will have an opportunity to submit course evaluation, where you will grade the course, content, and me. Your feedback is particularly important to me and NJIT and will help me in improving this course going forward. It is all about continuous improvements! |

## Weighted Grades:

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| **Class Participation (Online) – contribution to forums, questions, and case studies** | **20%** |
| **Quizzes (3 total)** | **15%** |
| **Term Project** | **25%** |
| **Final Project Report** | **15%** |
| **Final Exam** | **25%** |

**SYLLABUS CONTINUED ON THE NEXT PAGE**

## Detailed Course Schedule

| WEEK # | DATE | TOPICS | ASSIGNMENT | SUBMISSION DATES |
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| 1 | 9/2/2025 – 9/7/2025 | **Engineering Management & Project Management Concepts and Framework** | **Class Slides**<br>Introductions (Class) (I)<br>Acknowledgment (I) | <br>9/7/2025<br>9/7/2025 |
| 2 | 9/8/2025 – 9/14/2025 | **Time Value of Money & Compounding** Interest Rates, Inflation, Time Value of Money, Cash Flows, Single-Payment, Uniform-Series, Gradient Series, Annual Compounding | **Schaum's Chapters 1 & 2**<br>Assigned questions (I) | <br>9/12/2025 |
| 3 | 9/15/2025 – 9/21/2025 | **Basic Relationships** Algebraic Relationships, Discrete, Periodic Compounding | **Schaum's Chapters 3 & 4**<br>Assigned questions (I)<br>Assigned problems (G) | <br>9/19/2025<br>9/21/2025 |
| 4 | 9/22/2025 – 9/28/2025 | **Continuous Compounding & Economic Equivalence and Valuation Evaluation Methodologies** Continuous Compounding, Equivalence, MARR, FMV | **Schaum's Chapters 5 & 6**<br>Assigned questions (I)<br>Assigned problems (G) | <br>9/26/2025<br>9/28/2025 |
| 5 | 9/29/2025 – 10/5/2025 | **Quiz1** | Quiz 1 – Schaum's Chapter 1 -6 (I)<br>**Note: Quiz will be available for a duration on this date. Details will be communicated later. All students must take the quiz within the allotted time. No extensions are given unless communicated via NJIT OARS office.** | **10/2/2025 - 10/5/2025** |
| 6 | 10/6/2025 – 10/12/2025 | **Evaluation Methodologies** Present Worth, Future Worth, NPV, Rate of Return, Payback, ROI, Cost-Benefit Ratio, Budget Allocation | **Schaum's Chapters 7 & 8**<br>Assigned questions (I)<br>Assigned problems (G) | <br>10/10/2025<br>10/12/2025 |

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| 7 | 10/13/2025<br>–<br>10/19/2025 | **Economic Feasibility Analysis**<br>Project selection, Retirement and replacement decisions/economics, Depreciation | **Schaum's Chapters 9, 10 &11**<br>Assigned questions (I)<br>Assigned problems (G) | <br>10/17/2025<br>10/19/2025 |
| 8 | 10/20/2025<br>–<br>10/26/2025 | **Quiz2** | Quiz 2 – Schaum's Chapter 7 - 11 (I)<br>**Note: Quiz will be available for a duration on this date. Details will be communicated later. All students must take the quiz within the allotted time. No extensions are given unless communicated via the NJIT OARS office.** | **10/23/2025 - 10/26/2025** |
| 9 | 10/27/2025 – 11/2/2025 | **Foundations of Project Management:**<br>project vs. operations, PMBOK overview, project life cycle, role of project manager, team building | **PMBOK Guide -**<br>**Performance Domains:** Team, Stakeholders<br>**Principles:** All 12 Principles (overview)<br><br>Assigned questions (I)<br>Term project deliverable #1 (G) - Proposal | <br><br><br><br>10/31/2025<br>11/2/2025 |
| 10 | 11/3/2025 – 11/9/2025 | **Project Initiation & Planning:**<br>project selection (NPV, IRR, payback), RFP process & types, project charter, stakeholder analysis, communications planning, meeting planning | **PMBOK Guide –**<br>**Performance Domains**: Stakeholders, Planning, Delivery<br>**Principles:** Stewardship, Engagement, Tailoring<br><br>Assigned questions (I) | <br><br><br><br>11/7/2025 |
| 11 | 11/10/2025<br>–<br>11/16/2025 | **Project Planning:**<br>scope definition, WBS, scheduling, resource planning (RACI), team role allocation, methodologies (Waterfall, Agile, Kanban, Hybrid), meeting types | **PMBOK Guide –**<br>**Performance Domains:** Planning, Delivery<br>**Principles:** Tailoring, Systems Thinking, Value Delivery<br><br>Assigned questions (I)<br>Term project deliverable #2 (G) – Project Report | <br><br><br><br>11/14/2025<br>11/16/2025 |

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| 12 | 11/17/2025 – 11/23/2025 | **Quiz3** | Quiz 3 – PMBOK Guide Chapter 1,2,3, 2.1-2.6, 4.6<br>**Note: Quiz will be available for a duration on this date. Details will be communicated later. All students must take the quiz within the allotted time. No extensions are given unless communicated via NJIT OARS office.** | **11/20/2025 - 11/23/2025** |
| 13 | 11/24/2025 – 11/26/2025 | **Execution, Monitoring & Control:** managing execution, meeting effectiveness, metrics & KPIs, EVM basics (PV, EV, AC, CPI, SPI), Agile metrics | **PMBOK Guide -**<br>**Performance Domains:** Delivery, Measurement, Uncertainty, Planning<br>**Principles:** Adaptability, Value Delivery, Governance<br><br>Assigned questions (I) | <br><br><br><br>11/26/2025 |
| 13 | 11/27/2025 - 11/30/2025 | **Thanksgiving Break – Enjoy! – No Assignments** | | |
| 14 | 12/1/2025 – 12/7/2025 | **Project Closeout & Future of PM:** closing projects, lessons learned, continuous improvement, AI in PM, CAPM/PMP career preparation | **PMBOK Guide –**<br>**Performance Domains:** Delivery, Measurement, Uncertainty<br>**Principles:** Value Delivery, Adaptability, Continuous Improvement<br><br>Assigned questions (I) | <br><br><br><br>12/5/2025 |
| 15 | 12/8/2025 – 12/11/2025 | **Final Exam Review** | Review all course materials.<br>Term project deliverable #3 (G) - Final Report<br>Peer evaluation submission (I)<br>***(Must be submitted by the due date – no exceptions!)*** | <br>12/7/2025<br><br>12/11/2025 |
| 15 | 12/12/2025 | **Reading Days** | | |

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| 16 | 12/14/2025<br>–<br>12/17/2025 | **Final Exam**<br>(Comprehensive – Engineering Economics and Project Management)<br>**Note: FINAL EXAM will be available at a specific time. Details will be communicated later. All students must take the exam at the scheduled time.** | **Final Exam –**<br>**To be scheduled by Registrar / Schedule to be provided later.** | To be scheduled |

NOTE:

- **(I) indicated individual submissions**
- **(G) indicates group submissions**