New Jersey Institute of Technology
Department of Engineering Technology
ET 400 Professional Engineer (PE) Preparation

COURSE NUMBER	ET 400
COURSE NAME	Professional Engineer (PE) Preparation
COURSE STRUCTURE	3-0-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	S. Lieber/ M. Botros
COURSE DESCRIPTION	This course introduces students to the role and responsibility of a licensed Professional Engineer (PE). This includes the application process, preparing for the Fundamentals of Engineering (FE)-Other Disciplines exam, applying for Certification as an Engineer-In-Training (EIT), and subsequent steps towards becoming a PE. Career and professional development will also be discussed.
PREREQUISITE(S)	
COREQUISITE(S)	
RESTRICTIONS	Senior standing.
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective
REQUIRED MATERIALS	PPI FE Other Disciplines Review Manual – A Comprehensive Review Guide to Pass the NCEES FE Exam by Michael R. Lindeburg PE.
COMPUTER USAGE	Microsoft Office

COURSE LEARNING OUTCOMES (CO)	By the end of the course students should be able to: 1. Describe the role and responsibility of a Professional Engineer. 2. Understand defined areas of the Professional Engineer licensure process. 3. Apply math, science, and engineering knowledge towards solving typical problems found in the Fundamental of Engineering (FE) exam. 4. Develop an awareness of career and professional development required as a Professional Engineer.
CLASS TOPICS	Professional Engineer Role and Responsibility; Professional Engineer application process; Engineer in Training (EIT) process; Career and Professional Development; Personal Protective Equipment; Fundamentals of Engineering-Other Exam Topics: Mathematics; Probability and Statistics; Chemistry, Instrumentation and Controls; Engineering Ethics and Societal Impacts; Safety, Health, and Environment; Engineering Economics; Statics; Dynamics; Strength of Materials; Materials; Fluid Mechanics; Basic Electrical Engineering; Thermodynamics and Heat Transfer.
STUDENT OUTCOMES	The Course Outcomes support the achievement of the following ET Student Outcomes: **Student Outcome (1)** - an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline; **Related CO – 1-4**
GRADING POLICY	Attendance in the course is mandatory. Failure to attend will lead to unsatisfactory completion of the course.
ACADEMIC INTEGRITY	NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted.

	For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php
STUDENT BEHAVIOR	See Individual Instructor Policies, which can include: • No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories. • Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate. • No headphones can be worn in class. • Unless the professor allows the use during lecture, laptops should be closed during lecture.
MODIFICATION TO COURSE	The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.
CLASS HOURS & LOCATION	TBD
PREPARED BY	Samuel Lieber
COURSE COORDINATED BY	Samuel Lieber

CLASS HOURS

Monday 6:00 PM – 7:55 PM CKB 310

OFFICE HOURS:

By Appointment: mns34@njit.edu

HOMEWORK POLICY:

Homework shall be submitted on a weekly basis on Canvas

GRADING LEGEND

The course will be graded as Satisfactory/Unsatisfactory.

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

COURSE OUTLINE:

WEEK	DATE	MODULES
1	1/27	Introduction to Professional Engineer: • Role and Responsibility • Professional Engineer application process • Engineer in Training (EIT) process • Fundamentals of Engineering (FE)-Other Disciplines Exam • Career and Professional Development FE Exam- Engineering Ethics and Societal Impacts: • Codes of ethics (e.g., identifying and solving ethical dilemmas) • Public protection issues (e.g., licensing boards) • Societal impacts (e.g., economic, sustainability, life-cycle analysis, environmental, public safety) FE Exam- Safety, Health, and Environment: • Industrial hygiene (e.g., carcinogens, toxicology, exposure limits, radiation exposure, biohazards, half-life) • Basic safety equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment) • Gas detection and monitoring (e.g., O2, CO, CO2, CH4, H2S, radon) • Electrical safety • Confined space entry and ventilation rates • Hazard communications (e.g., SDS, proper labeling, concentrations, fire ratings, safety equipment)

2	2/3	FE Exam Materials: • Physical (phase diagrams) properties of materials (e.g., alloy phase diagrams, phase equilibrium, and phase change) • Mechanical properties of materials • Chemical properties of materials • Thermal properties of materials • Electrical properties of materials • Material selection
3-4	2/10 2/17	FE Exam-Statics: • Vector analysis • Force systems (e.g., resultants, concurrent, distributed) • Force couple systems • Equilibrium of rigid bodies (e.g., support reactions) • Internal forces in rigid bodies (e.g., trusses, frames, machines) • Area properties (e.g., centroids, moments of inertia, radius of gyration, parallel axis theorem) • Static friction • Free-body diagrams • Weight and mass computations (e.g., slug, lbm, lbf, kg, N, ton, dyne, g, gc)
5-6	2/24 3/3	FE Exam Strength of Materials: • Stress types (e.g., normal, shear) • Combined loading–principle of superposition • Stress and strain caused by axial loads, bending loads, torsion, or transverse shear forces • Shear and moment diagrams • Analysis of beams, trusses, frames, and columns • Loads and deformations (e.g., axial-extension, torque-angle of twist, moment-rotation) • Stress transformation and principal stresses, including stress-based yielding and fracture criteria (e.g., Mohr's circle, maximum normal stress, Tresca, von Mises) • Material failure (e.g., Euler buckling, creep, fatigue, brittle fracture, stress concentration factors, factor of safety, and allowable stress)
7	3/10	FE Exam Dynamics: • Particle and rigid-body kinematics • Linear motion (e.g., force, mass, acceleration) • Angular motion (e.g., torque, inertia, acceleration) • Mass moment of inertia • Impulse and momentum (e.g., linear, angular) • Work, energy, and power • Dynamic friction • Vibrations (e.g., natural frequency)

SPRING BREAK NO CLASS 3/17		
8-9	3/24 3/31	FE Exam-Fluid Mechanics • Fluid properties (e.g., Newtonian, non-Newtonian, liquids and gases) • Dimensionless numbers (e.g., Reynolds number, Froude number, Mach number) • Laminar and turbulent flow • Fluid statics (e.g., hydrostatic head) • Energy, impulse, and momentum equations (e.g., Bernoulli equation) • Pipe and duct flow and friction losses (e.g., pipes, valves, fittings, laminar, transitional and turbulent flow) • Open-channel flow (e.g., Manning's equation, drag) • Fluid transport systems (e.g., series and parallel operations) • Flow measurement (e.g., pitot tube, venturi meter, weir) • Turbomachinery (e.g., pumps, turbines, fans, compressors) • Ideal gas law (e.g., mixtures of nonreactive gases) Real gas law (e.g., z factor)
10-11	4/7 4/14	FE Exam- Thermodynamics and Heat Transfer • Thermodynamic laws (e.g., first law, second law) • Thermodynamic equilibrium • Thermodynamic properties (e.g., entropy, enthalpy, heat capacity) • Thermodynamic processes (e.g., isothermal, adiabatic, reversible, irreversible) • Heat transfer (e.g., conduction, convection, radiation) • Mass and energy balances • Property and phase diagrams (e.g., T-s, P-h, P-v) • Combustion and combustion products (e.g., CO, CO2, NOX, ash, particulates) Psychometrics (e.g., relative humidity, wet bulb)
12	4/21	FE Exam-Basic Electrical Engineering • Electrical fundamentals (e.g., charge, current, voltage, resistance, power, energy) • Current and voltage laws (e.g., Kirchhoff, Ohm) • AC and DC circuits (e.g., real and imaginary components, complex numbers, power factor, reactance and impedance, series, parallel, capacitance and inductance, RLC circuits) • Measuring devices (e.g., voltmeter, ammeter, wattmeter) Three-phase power (e.g., motor efficiency, balanced loads, power equation)

13	4/28	FE Exam- Instrumentation and Controls: Sensors (e.g., temperature, pressure, motion, pH, chemical constituents) Data acquisition (e.g., logging, sampling rate, sampling range, filtering, amplification, signal interface, signal processing, analog/digital [A/D], digital/analog [D/A], digital) • Logic diagrams
14	5/5	FE Exam- Engineering Economics: • Time value of money (e.g., present worth, annual worth, future worth, rate of return) • Cost analysis (e.g., incremental, average, sunk, estimating) • Economic analyses (e.g., break-even, benefit-cost, optimal economic life) • Uncertainty (e.g., expected value and risk) • Project selection (e.g., comparison of projects with unequal lives, • lease/buy/make, depreciation, discounted cash flow, decision trees)
15	TBD	Final Exam (70 questions in 3 hours)