Nuclear Engineering Analysis 1

ENU 4001 Class number: 22387
Class Periods: T R, Period 3-4, 9:35 - 11:30 a.m.
Location: MAT 105
Academic Term: Spring 2025

Instructor:
Andreas Enqvist
Enqvist@ufl.edu
352 294 2177
Office Hours: Tuesday 2:00-3:00, in-person or zoom as needed.

Teaching Assistants:
Please contact them through the Canvas website

- Emily Gunger, gungere@ufl.edu, NSC111, office hours: TBD

Course Description
Four one-hour lectures discussing continuous and discrete variable solution methods for the statistical, algebraic, differential and integral equations important in nuclear engineering. Topics covered include probabilities and statistics, basic programming, linear algebra.

Course Pre-Requisites / Co-Requisites
Pre-req: MAC 2313. Co-req: MAP 2302;

Course Objectives

1. Students will understand statistics and probability distributions including examples of how they apply to radioactive decay and transport topics
2. Students will apply the basics of computer programming to numerical nuclear engineering problem solving
3. Students will apply linear algebra for the purpose of problem solving in nuclear engineering and related fields

Materials and Supply Fees
N/A

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Title: Foundations in Applied Nuclear Engineering Analysis, 2nd Ed.
- Author: Glenn E. Sjoden
- Publisher: World Scientific Publishing Co
- ISBN number: 9814630934 (2nd Ed.)

- Title: MATLAB: A Practical Introduction to Programming and Problem Solving
- Author: Dorothy C. Attaway
- Publisher: Butterworth-Heinemann
- ISBN: 9780323917506

- Title: A First Course in Probability
- Author: Sheldon Ross
- Publisher: Pearson
- ISBN: 9781292269207

Recommended Materials

Software:

- One of MatLab, Mathematica, Maple, Engineering Equation Solver/TKsolver or equivalent alternative (other codes that can achieve some or all suitable tasks include: Python, R, Java, C etc).

Additional reading:

- Advanced Engineering Mathematics, KREYSZIG, 10th Ed., 9780470458365
- Schaum's outline of advanced mathematics for engineers and scientists, Murray Spiegel, Oct 2009, 0071635408
- Mathematics handbook for science and engineering, RADE, WESTERGREN, 2004, 9783540211419
- Physics handbook, NORDLING; OSTERMAN, 2006, 9789144044538
- Introduction to Nuclear Engineering, 4th Ed, J.R. Lamarsh, 2017, 9780134570051

Course Schedule (tentative)

Week 1:	*Introduction, prior knowledge test, Some Basic Terms and Definitions, Nuclear Intro*
Week 2:	*Basic Programming - User input and output, variables, operators*
Week 3:	*Basic Programming - Flow control: if statement, While loops, For loops, nested flow control*
Week 4:	*Programming - Series and patterns-based computation, Matrices, and vectors (arrays)*
Week 5:	*Programming – Algorithms, programs & data visualization & analysis*
Week 6:	*Probability & statistics – Essentials of Probability and Statistics &* ***Midterm Exam #1***

Week 7:	*Probability & statistics – Introduction to data, Distributions of random variables (Normal, Poisson, Binomial), Elementary probability rules, Conditional probability*
Week 8:	*Probability & statistics – Examining numerical data, Graphical methods, Numerical methods: the average, the standard deviation, etc*
Week 9:	*Probability & statistics – Probability & statistics – The central limit theorem, Inference for numerical data- one sample tests about a population mean*
Week 10:	***Spring break , no classes***
Week 11:	*Complex Numbers Exam review &* ***Midterm Exam #2***
Week 12:	*Linear Algebra: Vectors and Matrices, Linear systems*
Week 13:	*Linear Algebra: Solving a system of equations - operations*
Week 14:	*Linear Algebra: Solving a system of equations – differential systems,*
Week 15:	*Class Wrap and Review, Reading day - No class*
	Thursday 5/1/2024 @ 5:30 PM - 7:30 PM

Attendance Policy, Class Expectations, and Make-Up Policy

Students are expected to attend each class period. Periods that may be missed should be brought to the attention of the Instructor as far in advance of the class period as possible. In the event of an unexcused absence, it is the student's responsibility to obtain and review the material that was covered during that class period. If a student arrives late or leaves early, he/she is expected to do so with a minimum level of disruption to the class in progress. If a pop quiz is given before or after the student is in the classroom, such that the student does not attend the quiz, he/she will receive zero for that pop quiz (no make-up).

Electronic devices or other distractions are recommended to be avoided, the exemption being classes that deal with numerical methods and programming, during which it is welcome to follow or practice using suitable software or laptop or other devices as desired.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (4)	100 each	20%
Quizzes	100 each	10%
Midterm Exams (2)	100	40%
Final Exam	100	30%
		100%

Homework:

There will be about 4-5 homework sets during the course, consisting of 10-12 problems each. Homework sets will be generally due two weeks after the assignment is issued (by 5 PM). Late homework will receive a penalty of 10% per day late. Electronic submission on the Canvas web system only.

Mid-Term Exams:

Two cumulative exams will be given during the semester, tentatively scheduled for February 20 and March 28. I will give you a one-week advanced warning for each exam. Each exam will be given during normal class time

Final Exam:

A 2-hour final exam will take place on Thursday, May 1st 2025, at 5:30 PM - 7:30 PM in MAT 105 . This exam will be closed-book and will test the knowledge you should have acquired during the semester. The final exam will be cumulative. You can bring 2 pages (1 sheet) of handwritten notes to the exam.

Grading Policy

Percent	Grade	Grade Points
93 - 100	A	4.00
90 - 92	A-	3.67
87 - 89	B+	3.33
83- 86	B	3.00
80 - 82	B-	2.67
77 - 79	C+	2.33
73 - 76	C	2.00
70 - 72	C-	1.67
67 - 69	D+	1.33
63 - 66	D	1.00
60 - 62	D-	0.67
0 - 59	E	0.00

ENU 4001 is also a critical tracking course. "A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform,

including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*:* https://distance.ufl.edu/getting-help/; *https://distance.ufl.edu/state-authorization-status/#student-complaint*.