Syllabus: EIN 4511 Systems Design

Instructor Information:
- **Instructor:** Ebisa Wollega, Ph.D.
- **Office Location:** BARC 1170
- **Office Hours**: TWR 1:30 - 2:30 PM, or by appointment
- **Email address**: ewollega@floridapoly.edu

Course Information:
- **Course Number and Title**: EIN 4511 Systems Design
- **Credit Hours:** 3
- **Meeting Time:** TR 2:30 - 3:45 PM
- **Meeting Location:** IST 1017
- **Academic Term:** Spring 26

Prerequisites:
- ENG 3448 Operations Research
- STAT 3022 Probability and Statistics

Required Texts and Materials:
- **Textbook:** Blanchard, B. and Fabrycky, W.J., *Systems Engineering and Analysis*, 5th Edition, Pearson, 2011. Identifier: ISBN-13: 9780132217354

- **Reference book:** Groover, M.P, *Work Systems: The Methods, Measurement & Management of Work,* 1st Edition, Pearson, 2006. Identifiers: ISBN-10: 0131406507, ISBN-13: 978-0131406506
- **Equipment and Material:** Simulation software (Simio, AnyLogic), optimization software (Gurobi Optimizer, Google OR-Tools), machine learning (TensorFlow, Scikit-learn), Python programming language, Canvas, Florida Poly email

Course Delivery and Course Description:
- **Delivery Mode**: This three-credit hour course uses an in-person instructional format and will meet twice per week for a total of 2 hours and 30 minutes, with the remainder of the work being done outside of the classroom.
- **Course Website**: Canvas course management system.
- **Official Catalog Course Description**: This course covers the design of production and service systems processes to improve productivity using simulation, optimization, machine learning, quality control and improvement, human factors, and cost estimation techniques. Topics include functionality, quality, affordability, ergonomics, safety, reliability, sustainability, and trade-off analysis of the design factors.

- **Gordon Rule (6A-10.030):** No

Course Schedule (tentative):

Week	Date	Topic	Assessment
1	Jan 13/15	System selection	Project
2	Jan 20/22	Design for functionality	Project
3	Jan 27/29	Design for quality and reliability	Project, homework
4	Feb 3/5	Design for maintainability	Project
5	Feb 10	No classes – Career Day	
	Feb 12	Design for usability	Project
6	Feb 17/19	Design for logistics and supportability	Project, homework
7	Feb 24/26	Design for affordability	Project
8	Mar 3	**Exam 1**	
	Mar 5	Design for scalability	
9	Mar 10/12	Design for scalability	Project, homework
10	Mar 17/19	Spring break	
11	Mar 24/26	Design for ergonomics, health, safety, and welfare	Project, homework
12	Mar 31/Apr 2	System design test, evaluation, and validation	Project, homework
13	Apr 7/9	System design test, evaluation, and validation	Project
14	Apr 14	Design evaluation for sustainability, ethical and professional responsibilities	Project
	Apr 16	**Exam 2**	
15	Apr 21/23	Project	
16	Apr 28	Project presentation	
	Apr 30	Reading days - no classes	
17	May 4-8	Final exams week	All project deliverables due

Prepared by Ebisa Wollega (Ph.D. in Industrial Engineering), 01/22/2025.
Update by Ebisa Wollega (Ph.D. in Industrial Engineering), 01/08/2026.

Assignment/Evaluation Methods:

Homework	10%
Project	50%
Exam 1	20%
Exam 2	20%
Total	*100%*

Grading Scale:

Grade	A	B+	B	B-	C+	C	D	F
Percentage	90%	87%	83%	80%	77%	70%	60%	< 60%
GPA	4.0	3.33	3.0	2.67	2.33	2.0	1.0	0.0

Late Work/Make-up:

All assignments are due at the beginning of class on the due date. Assignments should be submitted in advance of an anticipated absence. Potentially included in the homework percentage are occasional quizzes. Late homework will not be accepted and missed quizzes cannot be made up at a later date. Make-up exams will be provided only for unique situations with provided documentation. Depending on the situation, if sufficient advance notice is not provided to the instructor, the exam may not be made up.

Participation:

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Course Objectives and Outcomes:

Course Learning Outcomes (ABET Outcomes):

At the time they graduate, BSIE and BSE graduates should have the following EN program outcomes.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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
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.

Course Objectives:
At the end of this course, students are expected to have the following knowledge, attitudes or skills. (Code in parentheses indicates the related Bachelor of Science in Industrial Engineering student outcomes)

   I.   Understand service and production systems design requirements (1).
   II.   Use qualitative and quantitative techniques to select systems that require improvements (1,7).
   III. Use engineering tools to design efficient systems (1,2).
   IV.   Design and present systems operations satisfying the design requirements such as functionality, safety, maintainability, and reliability (1,2,3,4,5,7).
   V.   Verify and validate design of system operations (7)

Academic Support Resources:

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations. Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit https://floridapoly.edu/writingcenter.

Civility and Collegiality:

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

Attendance:
- Students in face-to-face courses are expected to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor. (University Policy, FPU-5.0010AP) (see also University Policy).
- A+ Attendance may be used to track attendance or traditional roll call per preference of instructor.
- Note: Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.

Participation:
Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Other Expectations:
I expect you to
- Attend class on time unless serious circumstances keep you away.
- Take notes during lecture as the lecture slides/materials may not be comprehensive.
- Spend several hours a week reading the textbook/reference book. The course materials have been carefully chosen to be useful, engaging, and thought-provoking.
- Understand that I will not tell you everything you need to know. Independent learning is an important part of your engineering education, develop that skill through this course.
- Participate in class discussion, be a respectful, contributing member of your team in group assignments and discussions.
- Ask me questions about assignments that you do not understand.
- Help your colleagues in the class learn the material.
- Do your own work; however, you can talk about a problem with your classmates.

You can expect me to
- Attend class on time unless serious circumstances keep me away.
- Announce any course syllabus update in class.
- Give guidance so your team can function well.
- Lead class discussion so all can participate.
- Answer your questions and work with you to find more information.
- Give exams that fairly assess what you have learned.
- Grade your assignments fairly.

University Policies
Reasonable Accommodations
The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in

advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs
The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX
Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity
Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures
Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is **prohibited**.*

Academic Support Resources
- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to

students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).

- o **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.