### CEECS - Intelligent Control

**Current Course**
- **Prefix and Number**: EEL 6682
- **Course Title**: Intelligent Control

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**Current Course Change Request Form**

**Department**: CEECS  
**College**: Engineering and Computer Science

**Current Course**

<table>
<thead>
<tr>
<th>Current Prefix and Number</th>
<th>Current Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEL 6682</td>
<td>Intelligent Control</td>
</tr>
</tbody>
</table>

**Summary**: Syllabus must be attached for **ANY** changes to current course details. See Guidelines. Please consult and list departments that may be affected by the changes; attach documentation.

**Change title to:**

**Change prefix**
- **From:**  
- **To:**

**Change course number**
- **From:**  
- **To:**

**Change credits**
- **From:**  
- **To:**

**Change grading**
- **From:**  
- **To:**

**Academic Service Learning (ASL)**
- **Add**  
- **Remove**

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**Change description to:**

**Change prerequisites/minimum grades to:**
- **None**

**Change corequisites to:**

**Change registration controls to:**

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**Effective Term/Year for Changes**: Spring 2021

**Terminate course? Effective Term/Year for Termination**: 

**Faculty Contact/Email/Phone**: Hanqi Zhuang (zuang@fau.edu) / 297-3413

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**Approved by**:  
- **Department Chair**: Hanqi Zhuang  
- **College Curriculum Chair**: Francisco Presuel-Moreno

**Date**: 10/25/2020

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**Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.**
1. **Course title/number, number of credit hours**

   Intelligent Control / EEL 6682  
   3 # of credit hours

2. **Course prerequisites, corequisites, and where the course fits in the program of study**

   Prerequisites: None

3. **Course logistics**

   **Term:**
   Class location and time:

4. **Instructor contact information**

   **Instructor’s name**  
   Office address  
   Office Hours  
   Contact telephone number  
   Email address

5. **TA contact information**

   **TA’s name**  
   Office address  
   Office Hours  
   Contact telephone number  
   Email address

6. **Course description**

   Recent trends related to learning and decision-making capabilities of intelligent control systems using neural networks and fuzzy logic. Emphasis on controller design for industrial applications.

7. **Course objectives/student learning outcomes/program outcomes**

   **Course objectives**  
   This course aims at providing graduate students a comprehensive view of recent developments in computational intelligent design techniques using neural networks and Fuzzy logic. Various schemes are critically analyzed in order to provide a framework for students’ projects. Upon completion of this course, the student should be able to:
   - Know the concept of Neural Network, Fuzzy Logic and Evolutionary Computation (EC).
   - Learn about the application of NN, FL and EC to industrial process
   - Design intelligent Systems.
   - Evaluate the design according to the provided criterions
# Course Syllabus

## Student learning outcomes & relationship to ABET 1-7 objectives

Upon completion of this course, the student should be able to:

- Know the concept of Neural Network, Fuzzy Logic and Evolutionary Computation
- Learn about the application of NN, FL and EC to industrial process
- Design intelligent Systems
- Evaluate the design according to the provided criterions

## 8. Course evaluation method

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Projects</td>
<td>20 %</td>
</tr>
<tr>
<td>Homework</td>
<td>20 %</td>
</tr>
<tr>
<td>Midterm</td>
<td>24 %</td>
</tr>
<tr>
<td>Final Examination</td>
<td>24 %</td>
</tr>
<tr>
<td>Attendance</td>
<td>12 %</td>
</tr>
</tbody>
</table>

Note: The minimum grade required to pass the course is C.

## 9. Course grading scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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</thead>
</table>

## 10. Policy on makeup tests, late work, and incompletes

- No make-up Test
- Student will lose the entire 12 attendance grade points if she/he misses more than 2 classes or discussion sessions

## 11. Special course requirements

NA

## 12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

## 13. Attendance policy statement

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student’s responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student’s final course grade as a direct result of such absence.

## 14. Disability policy statement
In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU’s campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at [www.fau.edu/sas/](http://www.fau.edu/sas/)

15. Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU’s Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to [http://www.fau.edu/counseling/](http://www.fau.edu/counseling/)

16. Code of Academic Integrity Policy Statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [University Regulation 4.001](http://www.fau.edu/regulations/).

17. Required texts/reading

Class notes

18. Supplementary/recommended readings

* [Intelligent Control Systems Using soft Computing Methodologies](http://www.fau.edu/regulations/) by Ali Zilouchian and Mo. Jamshidi
  (recommended, not required)

19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

1. Introduction and motivation.
2. Engineering System design: Conventional approaches.
4. Learning and decision making for intelligent systems
5. Neural Network and Intelligent Control.
7. Systems modeling using Neural Networks.
8. Industrial applications of Intelligent Control using NN:
   * Temperature control system
   * Inverse pendulum balancer
   * Trailer truck Backer-upper
   * Manufacturing
   * Desalination technology
   * Computer Networking
   * Chemical processes
8. Fuzzy Set and Fuzzy logic.
10. Industrial applications of Intelligent Control - fuzzy Logic.
   * Steam Engine: First Application of Fuzzy Control
   * Washing Machine
   * Temperature control system
   * Inverse pendulum balancer
   * Trailer truck Backer-upper
   * Servo Motor
   * Robot manipulators
   * Traffic Flow
   * Automatic flight Control
   * Subway systems.
   * Automatic Focusing Systems
   * Car Engine
11. Combining ANNs and fuzzy logic: trade off and classes of applications.
12. Case studies.