New York City College of Technology
Department of Computer Engineering Technology

# CET 4925 – Internet of Things

URL: www.citytechrobotics.org/teaching/cet4925

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**Instructor:** Dr. Xiaohai Li (email: xhli@citytech.cuny.edu)
Office: V642, Tel: 718-260-5885
Office Hours: TBA on course website or Blackboard

**Course Description:** Introduction to the architecture of Internet of Things (IoT) and the basics of key technologies for developing an IoT system, including physical computing, communication, connectivity and IoT cloud. A variety of IoT implementations and applications are introduced. Students use some of the technologies with experimental hardware platforms to implement a prototype IoT system.

**Credit Hours:** 3 credits with 2 class hours and 2 lab hours

**Pre/Co-requisites:** CET 4711 or department approval

**Textbook:** No textbook is required for this course. Students are recommended to use the reference materials indicated in the below.

**References:**

1. Adrian McEwen and Hakim Cassimally, *Designing the Internet of things*, John Wiley & Sons, ISBN-10: 111843062X, ISBN-13: 978-1118430620, 2013.

2. Arshdeep Bahga and Vijay Madisetti, *Internet of Things (A Hands-on-Approach)*, VPT, ISBN-13: 978-0996025515, 2014.

3. Donald Norris, *The Internet of Things: Do-It-Yourself at Home Projects*, McGraw-Hill Education, ISBN-10: 0071835202, ISBN-13: 978-0071835206, 2015.

4. Dieter Uckelmann, Mark Harrison, and Florian Michahelles, *Architecting the Internet of Things*, Springer, 2011.

5. Daniel Minoli, "Internet of Things – Definitions and Frameworks", *Building the Internet of Things with IPv6 and MIPv6*, Chapter 2, p.28-47, John Wiley & Sons, 2013.

6. Olivier Hersent, David Boswarthick, and Omar Elloumi, *The Internet of Things : Key Applications and Protocols*, Wiley, 2011.

7. Jesse Liberty and Bradley L. Jones, *Sams Teach Yourself C++ in 21 Days (5th Edition)*, Sams Publishing, ISBN-10: 0672327112, December

24, 2004.

8. Tony Gaddis, *Starting Out with C++ from Control Structures to Objects (8th Edition)*, Pearson, ISBN-13: 978-0133769395, March 8, 2014.

Additional reading and reference materials will be provided on Blackboard or course website as needed.

**Softwares for Lab/Project:** Free or open-source software will be used in the class. Links to download the software will be posted on Blackboard or course website.

**Grading Policy:**

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|---|---|
| Attendance | 10% |
| Labs | 25% |
| Midterm Project Proposal | 15% |
| Final Project Report | 15% |
| Final Project & Extra Credits | 35% |

**Attendance:**

- Under CUNY mandate, attendance in each class is required.
- At the beginning of each class, the instructor will make a roll call of all the student names to check the attendance. Any lateness **MUST** be reported to the instructor by the students before the class is dismissed. A name without on-time attendance nor reported lateness will be considered as **absence**.
- 2 lateness will be considered equally as a absence.
- Final attendance score without any lateness nor absence record will be 100. Each lateness will lead to 15 point loss, and each absence will lead to 30 point loss in the final attendance score until the attendance score hits zero.
- Being absent for more than **3 times** or being late for more than **6 times** in a semester, a **WU** or **F** grade will be granted during or after the semester.
- Any absence due to emergencies (e.g., emergency medical condition or no-fault legal crisis) needs to be notified to the instructor. Excused absences can ONLY be considered with signed explanatory notes from proper party with proper authority.

**Lab Reports:**

- Lab reports must be submitted INDIVIDUALLY.
- All lab reports have to be submitted through Blackboard ONLY.
- Any late-due lab report will have **zero** grade.
- Copying other team's lab report is **zero** tolerant. *Both parties* involved in copying will be graded as zeros.
- Additional requirement on lab reports is posted on Blackboard or course website. Please read it carefully.

**Course Project:**

- 3 students (maximum) make up a team to finish the course project.
- Each team propose a course project (by the midterm, a project proposal has to be submitted). The proposal should clearly define the desired task or project objective.
- The final project demonstration is scheduled in the final week.
- Each team will have **15 minutes** to demonstrate the project and **10 minutes** to make a presentation on the final exam day. Any circuit schematic and programming code used for the project need to be presented. Team members will be interviewed for individual scores.
- See separate handouts for more details on the project.

**Project Proposal and Report:**

- Each team needs to submit a Midterm Project Proposal and a Final Project Report in the semester.
- The grades of the proposal and the report will be determined by the content completeness, technical soundness and presentation professionalism. Detailed requirements on the content and format will be posted on the Blackboard or course website. Please read carefully.

**Extra Credits:**

- Extra Credits may be offered for certain additional work or performance that are related to the class, such as extra homework, expanded lab, or expanded/advanced project.
- All extra credits will be counted with your final project score.

**Conduct Code:** Cell phone ringing and any other distracting and disruptive behavior such as talk loudly without permission are absolutely prohibited and may cause yourself being expelled from the class. Any activity that threatens the college academic integrity will result in a disciplinary action. Please refer to the Student Handbook and the Catalog of New York City College of Technology for a full listing of Student Code of Conduct, Classroom Behavior Guidelines and Academic Integrity Rules.

**Library Usage:** Students are encouraged to use the library for supplementary resources of the lectures and labs.

**Class Success Tips:** 1). **Study in groups!** Studies have shown that students who study in a group perform better than alone. So find your study buddies!

2). **Take complete notes** during lectures and review them thoroughly before you forget.

3). **Do the lab**, do not only stand aside to watch your teammate doing the lab. Be prepared for the pop-up quizzes, and seek help immediately

for any difficulty. Dont wait until the night before the test or the due date of the homework.

4). Speak up if you have questions or concerns, be it in class, during office hours, or via email.

5). Work through the example problems step by step and try some related problems.

6). Don't assume every concept can be be crystal clear to you just after a single reading. More than one reading of the material will be necessary.

7). Use Wikipedia and the references therein, instead of Google, as the first stop when you do research.

8). Students who are failing in the course may consider officially withdrawing on or before the Withdrawal Date to avoid an 'F' or 'WU' grade.

9). Use the tutoring service and other assistances provided by the college: **Learning Center** (V-217), **Student Support Services** (A-237), **The Counseling Center** (N-108).

9). **Make extra credits!** A variety of opportunities to make extra credits will be announced during the class. Grasp them and make some extra credits! You will find out how beneficial they could be to your final grade.

**Email:** All email to the instructor are suggested to be from an academic email account. Using any other public email account may cause email loss or rejection. Please always include "**CET 4925**" in the subject line of your email.

**Lecture Topics:** Listed on the course website

**Learning Outcomes:** Upon successful completion of this course, the student will be able to:
1. Demonstrate the ability to apply technical terms in the field of Internet of Things.
2. Demonstrate knowledge of the basic techniques of using a microprocessor or microcontroller platform for IoT applications.
3. Demonstrate knowledge of the basic techniques of developing communication components for IoT applications.
4. Demonstrate the ability to select and apply a knowledge of hardware and software tools to design and develop a prototype IoT system.
5. Demonstrate the ability of self-directed project proposing and concept development;
6. Function as a team member or leader and to communicate effectively orally and in writing;
7. Create a project management plan and follow the timelines for a quality and timely project development;
8. Understand the importance of professionalism and engineering ethics;
9. Demonstrate the ability of self-learning and life-long learning.

**Note:** This syllabus is subject to change.