UWEE Summer School Program

June 25 – August 6, 2017
University of Washington
Seattle, Washington, USA

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Where is Seattle?

Seattle in Washington State

Seattle
Washington

Washington DC
A Fast Growing High-Tech City
Seattle and the Pacific Northwest

- Mild weather within the Puget Sound area
- Abundant water (rainfall)
- Lush, verdant setting
- Comparatively low crime rates
- High regard for academics and scholarship
- Easy and diverse opportunities for a healthy lifestyle:
  - Skiing
  - Hiking
  - Boating
  - Cultural arts and events
University of Washington

– Student body: 40K+ @ Seattle campus (1/3 grad)
– Annual budget: ~$3B USD ($1.3B on research grants)
– 4th World’s Most Innovative Univ. (Reuters, 2015)
– 1st ranked Medical School (primary care schools)
– 2nd in biomedical engineering funding from NIH
– 6+1 Nobel prize winners since 1989
– 42/16 National Academy of Science/Engr members
– 3 National Medal of Science recipients
A Beautiful Campus @ Seattle WA
Electrical Engr. Department

• Founded in 1905
• New EE Building in 1997
• Degrees offered:
  – Bachelor of Science in Electrical Engineering (BSEE)
  – Master of Science in Electrical Engineering (MSEE)
  – Doctor of Philosophy in Electrical Engineering (Ph.D.)
• Rankings 2015:
  – The Chronicle of Higher Education: 8th
  – US News and World Report: 18th (graduate)
  – US News and World Report: 18th (undergraduate)
Our Faculty

• 41 Tenure-Track + 10 Research + 24 Adjunct + ~60 Affiliate Faculty
• 27 IEEE Fellows + 2 NAE Fellows
• Many Young Investigator Awards:
  – PECASE, NSF PYI, NSF Career, ONR YIP, AFOSR YIP, ARO YIP, NIH Career, IEEE EMBS Early Career
• Several MIT Technology Review Awards
• Significant professional services, leadership, and industrial consultant roles
Our Research Strengths

• **Communications and Networking**: wireless networking systems, secure networks and protocols, wireless multimedia

• **Electromagnetics and Remote Sensing**: microwave/millimeter-wave remote sensing, antenna design/modeling, computational electromagnetics

• **Integrated Systems, Circuits, VLSI**: low power circuits, wireless sensors, mixed signal circuits

• **Nanotechnology, MEMS, Photonics**: nanoelectronic/photonic devices, biological and molecular systems and models

• **Power and Energy**: modeling of heterogeneous energy systems, operating/planning of energy systems

• **Speech, Image, and Video Processing**: multimedia data analyses, data mining and machine learning, speech and language processing

• **Systems, Controls & Robotics**: bio-robotics, human-brain interfaces
Summer Program Overview

• Customized program for international Electrical Engineering and Computer Engineering students
• **Two engineering courses**, 24 hours/week (lecture and lab)
• **American academic culture course**, 2 hours/week (lectures and experiences)
• Visits to Seattle area businesses relevant to program curriculum (3-4 companies: Microsoft, Boeing, Tableau, Voicebox, T-Mobile, etc)
• Student immigration support (I-20s, F-1 student visas)
• Ground transportation to/from SeaTac Airport
• UW student experience: student housing, campus life
## Weekly Course Schedule

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<th>Time</th>
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<th>Tuesday</th>
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<td>8:30 – 9:20</td>
<td>EE233</td>
<td>EE299</td>
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<td>Lunch Break</td>
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<td>13:30 – 14:20</td>
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<td>Lab or Quiz (EE299)</td>
<td>Lab or Quiz (EE233)</td>
<td>Lab or Quiz (EE299)</td>
<td>Visit or Activities</td>
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EE233 CIRCUIT THEORY

• **Goals:** To learn how to analyze electric circuits in the frequency domain; to calculate power for electric circuits; to recognize and analyze common filters such as low-pass, high-pass, band-pass, and band-reject both for passive and active circuits; to learn how to use laboratory instruments such as the function generator, oscilloscope and multimeter for analyzing electric circuits that you build in the laboratory; to learn how to use MultiSim; to learn how to write a lab report on your experiments; to prepare students for more advanced courses in circuit analysis and design.

• **Prerequisites by Topic:**
  – DC circuit analysis
  – Transient analysis of electric circuits in the time domain
  – Solution of first and second order linear differential equations
  – Manipulation of complex numbers

• **Topics:**
  – Sinusoidal sources and responses, Phasors, network theorems
  – Average and Reactive power, complex power, power factor
  – Laplace transformation techniques
  – Circuit analysis with Laplace Transforms, transfer functions
  – Passive filters
  – Active filters
  – Basic EE laboratory, components, instrumentation and simulation

• **Course Structure:** Lecture (6 hours / week), Laboratory & Quiz (5+1 hours / week), weekly HWs

• **Grading:** 20% Homework, 20% Laboratories, 10% Lab Test & Quizzes, 20% Midterms, 30% Final
This hands-on class that introduces the ANSI C language and microprocessors. Through in-class exercises, homework, and a series of practical lab projects, students are encouraged to develop and practice good software design methodologies using the C language then apply these skills towards developing, debugging, and testing embedded applications for an Arduino microprocessor.

**Goals:** to learn, to work with, and to develop applications of modest complexity in the C language for an Arduino microprocessor.

**Topics:**

- **Introduction** -- A Brief Look Inside the Computer, Introduction to C, Programs, and Program Design
- **The Microprocessor** -- Basic Architecture, Hardware and Software, Input and Output
- **Identifiers C Data Types Variables and Numbers**
- **Basic Electronics** -- Introducing Electricity, Fundamental Items and Terminology
- **Program Structure**
- **Characters and Strings**
- **Operators**
- **Control and Control Flow**
- **Pointers**
- **Basic Data Structures - Containers**
- **Bringing Your Program Together**

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Classes and Labs
Students Evaluations (2015)
Summer Program Cost Overview

• Program Tuition
  – Program: $5,500 per student (minimum 37 students)

• Travel Costs
  – Separate from program tuition
  – Your school book/purchase flights
  – All students on one flight to/from Seattle
  – Ground transportation to/from SeaTac provided by UW

• Housing & Meal Costs
  – Separate from program costs
  – UW dormitory housing (North Campus)
  – Double occupancy (shared rooms); single occupancy (very limited)
  – Student flexible dining options: debit cards for campus food venues

• Total estimated cost per student - $9,800
  – Program $5,500; travel ~$1,000; housing ~$2,460 (single); meals ~$820
Hope to see you in Seattle!