ELEC4123 / TELE4123 / PHTN4123
Electrical/Telecoms Design Proficiency

Elias Aboutanios

Course Outline
Session 2, 2009
Course Staff

Course Coordinator and Lecturer in Charge  
*Dr. Elias Aboutanios*  
Room EE308  
Phone: 9385 5010  
Email: elias@unsw.edu.au

Tutors  
To be announced

Lab Demonstrators  
To be announced

Class Times and Locations

**Lectures**  
*Elias Aboutanios*  
Tues. 9-10am  
CLB 6 (F19*)

**Tutorials**  
To be announced

**Labs**  
Lab1: Tue 2pm-6pm  
ElecEng101  
Lab2: Tue 2pm-6pm  
ElecEng102  
Lab3: Tue 2pm-6pm  
ElecEng125  
Lab4: Tue 2pm-6pm  
ElecEng113  
Lab5: Tue 2pm-6pm  
ElecEng114

*For the map references of the classroom locations see the [Campus Map (click here)](http://campusmap.com).

Consultation

The lectures, tutorials and labs are the primary avenues of contact between the teaching staff and the students. The consultations are not meant to replace these, but to allow the students to raise concerns (or ask questions) they might have with the lecturer in charge should the standard contact channels prove inadequate. Initially, one consultation hour will be allocated on **Tuesdays from 11am to 12pm** and will be conducted in **Room EE308**. Further consultations could be arranged by appointment. If required and deemed appropriate, additional consultation times could be allocated in the course of the semester and announced on the subject website.

Students may contact the lecturer by email to seek an appointment or ask a question. However, while every effort will be made, a response is not always guaranteed and the students are encouraged to take full advantage of the consultation hour.

Course Information

**Course Load and Weight**

*This course is worth 6 units of credit (UoC).*

The University defines a UoC as requiring 25 hours of total learning effort per semester (spread over lectures, tutorials, labs, and the student’s own study time.) Therefore, it is expected that 150 hours will be allocated to this course. Counting the laboratories (approx. 35 hours per semester), tutorials (10 hours), Lectures (5 hours) gives a total of approximately 50 formal contact hours. The students should then allocate around 10 additional hours per week to the subject. This is in line with the expectation of 2 hours of study for every hour of formal contact.

**Description and Aims**

Whereas the theoretical skills that students acquire during their time at university form a strong foundation for their future career, companies have naturally been placing particular emphasis on the design skills of our graduates. The goal of this subject is to allow the students to demonstrate their ability to integrate the various subjects and concepts (the theoretical foundations) they have acquired in the first three years of their degree and apply them to carry out practical design. In addition to assessing their design skills, this course gives the students the opportunity to identify,
with the help of the teaching staff, weak points they might have in the streams being examined and provides them with a chance to mend those shortcomings. The aims of the course are:

1. Provide the student with a realistic design experience.
2. Ensure the student’s design skills are adequate and to the level desirable for a graduate engineer.
3. Give the student the opportunity to address weaknesses in their design skill base and to advance this skill base.
4. Prepare the students for the transition from the learning environment to the professional setting where these design skills are essential.

Organisation

The student will be assessed on practical design skills that are relevant to industry. For this purpose, we have identified four principal streams (for each of the ELEC and TELE/PHTN groups). Two of these streams are common to the ELEC/TELE/PHTN students. These streams are listed below:

Streams in common to the ELEC and TELE/PHTN strands:

C1. Electronic Circuit Design: Devices, amplifiers, tuned circuits, opamp circuits, DC and AC analysis, component ratings and tolerances...

C2. Signal Processing Design: Filter design, frequency response, spectrum analysis, BIBO gain...

Streams Specific to Electrical Design Competency:

E1. Control System Design: Feedback and stability, linear control, non-linear control, data acquisition and sampling, real-time software control...

E2. Power System Design: Transformer design, motor specifications, power factor management, electronic drive systems...

Streams Specific to Telecommunications Design Competency

T1. Physical Communication Design: Baseband communications, AM/FM modulation, interference, multiplexing, power spectrum shaping, matched filters, phase locked loops...

T2. Data Networking Design: IP addressing, router configuration, socket programming...

Additionally, the laboratory part of the course will run from weeks 3 to 13 and will be organised as follows:

- **Introductory laboratory:** This is intended to allow the students to familiarise themselves with the equipment and format of the course.

- **Regular laboratory tasks:** There will be four (4) design tasks, each of which to be run over two four (4) hour lab sessions. In the first session of each lab (which will be held in weeks 4, 6, 8 and 10), the students will prepare a preliminary design and present it to their peers. The second session of each lab (which will be held in weeks 5, 7, 9 and 11) are dedicated to the implementation of the design and its assessment.

- **Supplementary laboratory tasks:** These will be held in weeks 12 and 13 of the semester. Should the student fail a lab in the regular part (a student is allowed to fail up to two labs in the regular part without immediately failing the course. Failing a third, however, leads to an immediate fail for the subject) he/she will be able to do a supplementary lab task to replace it. However, as explained in the assessment section, the maximum achievable mark is in this case 12.5%.
Relationship of the Course to the Program and Other Courses

This is a fourth year core subject that has all of the third year core subjects as pre-requisites. Coming into the course, the students should already have had significant experience in design from the first year ENG1000 subject and third year course ELEC/TELE 3117. Therefore, this course is not concerned with teaching the design process itself, nor the basic theories and concepts of any of the streams listed above. Instead, the combination of the student’s theoretical knowledge and design skills in areas that are relevant to their future career will be assessed. Consequently, this course is quite significant in preparing the student for the step from the study to the professional environment. Furthermore, this course is different from the thesis as each design task has a narrow scope, and is targeted at specific areas of proficiency that will have high relevance to the Electrical Engineering profession. The thesis, on the other hand, is concerned with the overall successful completion of a major project from the specification stage, to the project management, and the final reporting.

Teaching Methods

The laboratories will form the primary method of instruction for this course. The students are expected to prepare for each of the design lab session prior to arriving at the laboratory. During the lab session, they will be guided and supported by the lab demonstrators. However, as this is an assessment exercise, the staff will provide careful guidance such that the fundamental contribution to the design task remains the student’s. Essentially, this means that a realistic work environment where the engineer must have the fundamental knowledge and design skills but is able to solicit general guidance will be emulated.

The teaching methods adopted are optimised to ensure the aims and learning outcomes of the course are achieved. These include:

1. Design tasks that are formulated to enable the students to combine their theoretical knowledge acquired from the technical subjects with their design skills obtained from ENG1000 and ELEC/TELE3117.
2. Assessment targeted at evaluating the students’ abilities and identifying weaknesses in their skill base.
3. A schedule that gives the students the opportunity to address those weaknesses and attempt the assessment a second time.
4. A laboratory organisation that in addition to the evaluation of the design process, provides for the students to improve their presentation and communications skills as well as their sense of working in an engineering community.

Learning Outcomes

As previously explained, this course is designed to test the students’ design skills. Upon the successful completion of the subject, the student will

1. Have shown their capacity to successfully harness their technical knowledge to carry out meaningful design tasks in each of the competency streams listed above.
2. Have identified and corrected any issues or failings in their knowledge base.
3. Be able to identify the design requirements and the relevant concepts and resources in order to successfully reach the design goals.
4. Have demonstrated, in the case that the advanced part is attempted, the ability to combine various streams of Electrical Engineering to develop a solution to a design problem.
5. Be in a position to make a positive contribution to the workforce as a professional Electrical engineer.

The teaching methods and learning outcomes are designed to strengthen the graduate attributes adopted at UNSW, and in particular:

1. the capacity for analytical and critical thinking and for creative problem solving;
2. the ability to engage in independent and reflective learning;
3. Information Literacy the skills to locate, evaluate and use relevant information;
4. the capacity for enterprise, initiative and creativity;
5. the skills of effective communication.

Plagiarism

The University takes plagiarism very seriously and those committing this act are dealt with strictly. According to the University website, “Plagiarism is taking the ideas or words of others and passing them off as your own. Plagiarism is a type of intellectual theft. Plagiarism can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. Plagiarism can have serious consequences...”

In addition to being dishonest and unethical, plagiarism severely hinders the learning process of the person engaging in it. For more information please refer to the UNSW Plagiarism Policy.

Assessment

The assessment consists solely of the lab exams and there is no final examination. Each of the labs is work 25% and a pass mark (12.5%) must be obtained for each of them for the student to pass the subject. A student is allowed to fail a maximum of two labs in the regular part of the course. In this case, the student will get a chance to repeat the lab in the last two weeks of the semester (weeks 12 and 13), but will be doing the design task in a single four (4) hour lab session. Should the student then perform satisfactorily, they will get a mark of 12.5%. Therefore, for each lab they fail, the student’s maximum attainable mark reduces by 12.5%.

Course Schedule

The preliminary course schedule is shown in the table below. Note that as this is a new course, this program is subject to change as necessary to improve students’ experience.

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<thead>
<tr>
<th>wk</th>
<th>Activity</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Introductory lecture - The Design Process.</td>
<td>Laboratory - Introductory Lab.</td>
</tr>
<tr>
<td>4/5</td>
<td>Laboratory</td>
<td>- Assessment Lab 1.</td>
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<tr>
<td>6/7</td>
<td>Laboratory</td>
<td>- Assessment Lab 2.</td>
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<tr>
<td>8/9</td>
<td>Laboratory</td>
<td>- Assessment Lab 3.</td>
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<tr>
<td>10/11</td>
<td>Laboratory</td>
<td>- Assessment Lab 4.</td>
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<tr>
<td>12</td>
<td>Laboratory</td>
<td>- Supplementary Lab 1.</td>
</tr>
<tr>
<td>13</td>
<td>Laboratory</td>
<td>- Supplementary Lab 2.</td>
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</tbody>
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Resources

Recommended Texts: This course has no specific recommended text. As it heavily relies on the core subjects of the third year of the degree, the textbooks of those subjects and their course notes are recommended resources for the students.

Links: The primary source of information and resource for this course should be the subject website, which can be accessed at using your student number and unipass. Additionally, the students are encouraged to use the resources of the third year subjects available from their websites, which are accessible at https://subjects.ee.unsw.edu.au/.

Other Resources: The students are reminded that the UNSW library is an excellent resource.
Continual Course Improvement

This course is under constant revision in order to improve the learning outcomes for the students. Any constructive feedback would be greatly appreciated and can be communicated to the lecturer in charge. Also we encourage the students, at the end of the semester, to provide us with their feedback (positive or negative) on the course and their experience of it via the Course and Teaching Evaluation and Improvement Process.

Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School’s policies and procedures.