Course Objectives:

In the current state of the art in the supply of electrical energy, there is an increasing need to make the overall electrical systems in residential building, large commercial buildings and in industrial sites etc -

- more energy efficient, with better energy management
- safer in all aspects (including personnel safety, fire and equipment safety)
- of adequate power quality with regard to harmonics and over-voltages
- able to accommodate modern information technology systems
- be compliant with the new EMC and EMI regulations for electrical systems
- provide monitoring systems to assess the condition of the electrical installation.

This course aims to address these issues. To fulfil this purpose, the following contents are arranged: overview on power supply to end users, mainly including industry plants and residential buildings; switchboard selection and design for a specific applications; selection of cable sizes with the consideration of current rating, and voltage under different operating conditions, such as different ambient temperature and different bundling etc; study on and selection of distribution transformers; Fault current calculation for three-phase symmetrical fault; overcurrent protection for power distribution circuits; earthing or grounding system study; lightning protection system study; power quality and reactive power compensations issues etc.

Brief Syllabus:

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<td>3. Cable sizing</td>
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<td>5. Fault analysis</td>
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</table>
Staff Contact Details

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Email</th>
<th>Availability; times and location</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

Aims of this course

The aim of this course is to equip students with fundamental knowledge of designing power supply to a new commercial, residential and industrial buildings etc.

Student Learning Outcomes and Graduate attributes

At the conclusion of this course, the students will be able to grasp:

1. switchboard selection and design for a specific applications;
2. selection of cable sizes with the consideration of current rating, and voltage drop under different operating conditions, such as different ambient temperature and different bundling etc;
3. knowledge on selection of distributed transformers;
4. fault current calculation for three-phase symmetrical fault;
5. overcurrent protection for power distribution circuits;
6. earthing or grounding system study;
7. lightning protection system study;
8. power quality and reactive power compensations issues etc.

Lecture Notes

Lecture notes written by the lecturer for each section will be available from the course webpage. These will be based on the following text books and other reference material which will be cited within the lecture notes.

All lecture notes, assignments, tutorial and technical report topics for this course can be downloaded on the school webpage, via Current Students → Study Notes → Lecture Notes. You may have to use username: (your student number) and password: ee&tview in order to access these documents. Students will be expected to bring the printed lecture notes and tutorial sheets into the lecture/tutorial room.
Tutorials:

Lectures will be supplemented with problem solving tutorial sessions. There will be five to six tutorial sessions. The problem-solving sessions will be on most recently covered topics.

Assessment:

Students will be assessed according to the following scheme:

- **Final examination (80%)**: The exam is a standard closed-book 3 hours written examination, covering all aspects of the course that have been presented in the lectures and tutorials. The examination tests analytical and critical thinking and general understanding of the course material. Assessment is a graded mark according to the correct fraction of the answers to the exam questions.

- **Quiz (20%)**: There is one quiz, which weighs 20% and is of two hours duration and is in form of closed-book. It is provided in order to get early feedback on students’ performance.

References:

1. AS/NZS 3000:2007 Wiring Rules
3. AS/NZS 3019:2007 Electrical installations – Periodic verification
4. AS/NZS 4836:2001 Safe working on low-voltage electrical installations
5. AS/NZS 3018:2001 Electrical installations – Domestic installations
6. AS3439.1-2002 Low Voltage Switchgear and Controlgear Assemblies – Part 1: Type-tested and partially type-tested assemblies
7. AS/NZS 3439.2:2002 - Particular requirements for busbar trunking systems (busways)
8. AS/NZS 3439.3:2002 - Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards (IEC 60439-3:1990, MOD)
9. AS 2067-2008 - Substations and high voltage installations exceeding 1 kV a.c.
10. AS/NZS 3008.1.1:1998 Electrical Installations - Selection of Cables Part 1.1: Cables for alternating voltages up to and including 0.6/1 kV – Typical Australian installation conditions
11. AS/NZS 5000.1:1999 Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 kV
12. AS/NZS 3198:1996 Approval and test specification - Electric cables - XLPE insulated - For working voltages up to and including 0.6/1 kV (superseded)
13. AS/NZS 1429.1:2000 Electric cables - Polymeric insulated - For working voltages 1.9/3.3 (3.6) kV up to and including 19/33 (36) kV
14. BS 7671: 2008, IET Wiring Regulations
15. AS60076.1-2005: Power transformers – General
16. AS2374.7-1997: Power transformers - Loading guide for oil-immersed power transformers
17. AS2374.8-2000: Power transformers - Application guide
18. AS60076.11-2006: Power transformers - Dry-type transformers
19. AS3953-1996: Loading guide for dry-type power transformers
20. AS60044.2-2003: Instrument transformers - Voltage transformers