

SECTION 1: ACADEMIC BOARD COURSE PROPOSAL

PART 1: OVERVIEW OF PROPOSAL

Faculty: Engineering & Information Technologies

School presenting the proposal: Electrical & Information Engineering

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Date course approved by Faculty:

1.1.1. Type of proposal: **New**

1.1.2. Type of course: **Postgraduate Coursework**

1.1.3. Name of Award course(s)
Name of **New** Award course: Master of Engineering Studies (Power Engineering)

1.1.4. Abbreviated name
MES (Power Engineering)

1.1.5. Date of introduction or deletion
Introduced: Year 2008 Semester 1

1.1.6 Availability to students

Commonwealth supported students	<input type="checkbox"/>	Full-time	<input type="checkbox"/>
		Part-time	<input type="checkbox"/>
Fee-paying local students	<input checked="" type="checkbox"/>	Full-time	<input checked="" type="checkbox"/>
		Part-time	<input checked="" type="checkbox"/>
Fee-paying international students	<input checked="" type="checkbox"/>	Full-time	<input checked="" type="checkbox"/>
		Part-time	<input type="checkbox"/>
Research Training Scheme	<input type="checkbox"/>	(Postgrad. Research students only)	

SECTION 1: ACADEMIC BOARD COURSE PROPOSAL

PART 2: DETAILS FOR ASSESSMENT OF PROPOSAL

1.2.1 Purpose of the proposal

The purpose of this proposal is to introduce a new award course, the Master of Engineering Studies in Power Engineering. The course is designed to meet the needs of the Australian and overseas power industry by producing graduates with the strongest possible technical skills. The existing lack of engineering skills in the market place to fulfil the needs of the power industry and the forthcoming retirement of a large portion of the working force will create an even more significant skills shortage in this area. This serious matter has been identified by the Australia Power Institute (API, established in 2004 as an industry response to the skills shortage situation) and a recent study done by Engineers Australia (2004) mentioned a crisis situation that needed to be addressed urgently. The recommendation of the said study to the power industry, as an immediate course of action to rectify the skills shortage situation, was the introduction of new undergraduate and postgraduate programs in the field of power engineering.

The University of Sydney has recently received a significant investment from EnergyAustralia for the establishment of the Chair of Power Engineering (2006) and has already introduced a new undergraduate stream in power engineering (2006 proposal for 2007). The School of Electrical & Information Engineering has had the first intake of students in the undergraduate power engineering degree in February 2007.

This proposal aims to complete the picture of addressing the skills shortage situation at postgraduate level as a response to industry's requests and concerted efforts to establish such postgraduate program.

Moreover, the continuous growth of the developing countries such as India and China and countries from the Middle East requires a large numbers of engineers with skills in electrical engineering and in particular in power engineering. Strong technical engineering skills are needed in order to meet demands for the proper design of the electricity network infrastructure, its building and expansion as well as operation and maintenance.

The proposed course will also complement a strong research group emerging in power engineering and related topics and will assist the sourcing of PhD students following their graduation with the proposed Master of Engineering Studies in Power Engineering. The proposed course will provide the opportunity to a number of graduates with the Master qualification to take a research path in the same field.

1.2.2 Justification for proposal

The Need

The main reasons for the proposal have been already highlighted in the section 1.2.1 above. The benefit of having postgraduate students with the proposed qualification is to clearly assist Australia and the power industry in particular, by supplying engineers who have the appropriate knowledge and skills and will be able to develop, maintain and support the electrical and power system infrastructure for the decades to come.

It also offers professional development opportunities for engineers already working in the power industry who need further qualifications to progress at professional level, including necessary education and training towards a corporate status of the Engineers Australia Institution.

Background

The University of Sydney has had a long history of strength in the area of Power Engineering for many decades. This was compromised in the last few years for numerous reasons which are beyond the scope of this proposal. The exciting news is that the previously mentioned situation has been reversed recently in a spectacular way through a number of key developments, which can be summarised as follows:

- The appointment of the EnergyAustralia Chair Professorship in Power Engineering.
- The appointment of a Lecturer in the area of Power Electronics.
- The forthcoming appointment of a Research Assistant to the EnergyAustralia Chair Professor in the area of Power Engineering (Sesqui Lectureship).
- The planning of new and advanced power engineering laboratories, a significant and ongoing project that has attracted funding from external sources and is underway to be realised within the rest of the year.
- The access to High Voltage Laboratories of EnergyAustralia for both the undergraduate and postgraduate teaching programs at the University of Sydney, something that most Universities cannot even dream off, let alone enjoy having access to.

There is another strong historical institution within the School of Electrical and Information Engineering that deserves mentioning. The EIE School enjoys the support of the Electrical and Information Engineering Foundation. Key industries in New South Wales and Sydney, many with electrical and power engineering background support the mentioned Foundation. Specifically, the Foundation's Board has a number of key Foundation Governors as members, sourced from companies such as ABB Australia, RailCorp, ALSTOM Power, EnergyAustralia, NHP Electrical Engineering Products, Tyree Holdings and many others.

A large number of benefits are attached to the membership of the Foundation as a Governor.

The important ones for this proposal are as follows:

1. Forward Planning the Needs of Industry and the School

Foundation Governors are invited to nominate staff to participate in industry sector reference groups with the tasks of:

- (a) identifying industry's anticipated demands for graduates and research in their sector,
- (b) making recommendations to the School on actions the School might take to develop its resources to better satisfy industry's anticipated demands.

The reference groups are: Computer & Software Engineering, Power Engineering and Telecommunications Engineering.

2. Monitoring the Relevance of the Curriculum

Foundation Governors are invited to nominate staff to participate in reviews of the School's five degrees giving them a say in the courses being taught and ensuring their relevance to industry's needs for graduates. The degrees are:

- BE Computer Engineering
 - BE Electrical Engineering
 - BE Power Engineering
 - BE Software Engineering
 - BE Telecommunications Engineering
3. Presenting Career Opportunities to the Students
 4. Meeting the Top Students
 5. Reviewing the Students through their CVs
 6. Networking
 7. Invitations to the Research Conversazione
 8. Invitations to the Graduation Dinner
 9. Invitations to the Pro-Vice-Chancellor's Industry Partnership Forum

The subscription rate for Governors is \$6,000 per year plus GST, income tax deductible.

From the EIE Foundation President's report presented on 10 March 2005, the following extract is relevant to this proposal:

Industry Participation in University Forward Planning

During the year the Foundation formed a Power Industry Reference Group in response to recommendations made by our Forward Planning Committee during 2003. The Group heard that all the New South Wales power utilities had fallen behind in network capital expenditure over the last ten years. All the utilities reported government approval to undertake new major expenditures. The result was that, after several years of low demand for power engineers, there was now a critical shortage. EnergyAustralia reported its intention to take on a large number of graduate engineers capable of being trained over a several year period to manage the organisation's systems. The company was planning to recruit 30 graduate engineers in both 2004 and 2005. Integral Energy reported that expenditure on its network had shrunk by 60% during the 1990s. The organisation was now facing an influx of 18,000 new subscribers per year plus higher demands for reliability because of computers. The Group heard that demand for power in countries like India and Malaysia was growing at much higher rates than in Australia and that these countries would send students to Australia to study power engineering if the courses were available. The Group learnt that an Australian Electric Power Institute had been formed to provide a mechanism for augmenting electric power engineering education and research in Australia. The Institute intended to work with university engineering faculties to ensure there were adequate resources for the teaching of core power subjects and for power research. The Group recommended that the School enter into discussions with the industry and the Australian Electric Power Institute on ways in which the industry and the Institute could assist the School to develop the School's academic staff and other resources in the electric power engineering area to work towards the introduction of a new BE Power Engineering Degree. In response the School has prepared a paper proposing the introduction of a BE Power Engineering Degree, outlining the funding requirements and suggesting how industry and the Australian Electric Power Institute might assist in bringing this about. The growing shortage of power engineers is a well-known fact to many of our members and we look forward to further developments during 2005.

Since then, EnergyAustralia has agreed to fund a Chair in Power Engineering and Professor Vassilios G. Agelidis was appointed in December 2006. The proposal of the Master of Engineering Studies in Power Engineering is one of the most strategic steps academically, following the introduction of the Bachelor of Engineering degree in Power Engineering last year, towards capitalising on the investment and momentum. This will deliver results not only for the sponsor of the Chair (EnergyAustralia) and the associated needs for engineers with relevant and strong technical skills but also for the Australian power industry at large.

Academic Rationale

The technology advancements in the field of power engineering over the last two decades have been significant. The introduction of communication and information technologies, the evolution of power electronics and the availability of electronic control systems for the electrical network, against old and problematic mechanical systems, necessitate that engineers seek further qualifications following their undergraduate degree due to technology evolution. This applies not only to current and future graduates but also to a large number of graduates that have left university over the last two decades. Such opportunities are not addressed by other postgraduate qualification offering at the University of Sydney and no other Australian university offers a similar degree to the one proposed here. The interaction between other universities and the power industry is minimal and most academic institutions have no ways to support such offering due to the lack of technical and state-of-the-art laboratories. These laboratories are under development at the University of Sydney with the aim to become fully operational by the end of the year with support coming from the industry. Moreover, the proposed MES in Power Engineering degree will create significant opportunities for growth of the EIE School through the intake of large numbers of international students who seek such qualifications and cannot obtain them from other institutions in the Asian-Pacific region. Such extra funding will allow us to expand significantly our research areas within the power engineering field from the current ones. Naturally, for research expansion requires not only funding but also research capable and qualified people and the proposed Master will supply us the latter.

Learning and Teaching Objectives

The learning and teaching objectives of the proposed course are directly linked to the skills, attributes and knowledge a graduate can be expected to achieve. These skills and attributes are listed as follows:

Engineering and Information Technologies Faculty:

<http://www.itl.usyd.edu.au/GraduateAttributes/facultyGA.cfm?faculty=Engineering>

University generic graduate attributes:

<http://www.itl.usyd.edu.au/GraduateAttributes/statement.htm>.

University Strategic Plan, Goals and Priorities and Proposed Master Program

The proposed Master of Engineering Studies in Power Engineering is a challenging and professionally relevant postgraduate degree program, assisting University's endeavours in meeting the priorities and confirming the University's continuing adaptation as an institution to employer and community needs. The proposal therefore meets key University strategic objectives associated with teaching and learning as included in the Strategic Directions 2006-2010 document.

Faculty Plan and Proposed Master Program

The proposed program contributes to the following strategies of the Faculty:

- *Grow Revenue (and Margin) through increased offers to students (at undergraduate and postgraduate level)*

There is an extensive market for the proposed Master program locally and overseas mainly due to the fact that the field of power engineering has long been neglected and the situation for the industry has reached a crisis. Skills and expertise are need for the power engineering industry. This proposal will assist the EIE School to source higher number of fee paying students and therefore is a strategic initiative as outlined by the Faculty goal above.

- *Improve Graduate Quality, through Learning by Innovative Pedagogy and Curriculum*

The approach to be used in the proposed Master program will make extensive use of project based learning and laboratory work contributing directly to the above mentioned strategic goal.

Proposal's relevance to students, employers and professional organisations

The proposal is considered very relevant towards addressing the needs of employers and professional organisations, namely Engineers Australia. The link to the employer's needs is clear through the input of a large number of companies operating in the power industry as expressed through the EIE Foundation. The proposal is also relevant to students who as graduate engineers aim at obtaining necessary corporate status within the Engineers Australia Institution and require professional development and further education to qualify.

Proposal's implications on the University's existing offerings

There are no implications on the University's existing offerings other than completing the picture at postgraduate level of all five undergraduate areas where the School of Electrical and Information Engineering makes offerings.

1.2.3 Benchmarking, market research and analysis

Extensive market research has been conducted and selected results are as follows:

(i) Benchmarking:

As have been explained in previous sections of this proposal, the lack of undergraduate and post graduate programs in power engineering in Australia and overseas has presented a serious issue to the power industry In Australia, this has been addressed through the introduction of the Bachelor of Engineering major in Power Engineering at the University of Sydney. Most Australian universities offer Master of Engineering programs in general electrical engineering or specialised ones. These programs will be reviewed in the following section on market analysis and research. However, as a general comment, it should be mentioned that no Australian university offers a similar Master program when it comes to the academic and strong technical content itself. This will be supported through the evidence to be discussed in the following section.

(ii) Market research and analysis:

The University of Queensland:

The Master of Engineering (ME) degree is a 3-semester program offered by the Schools of Engineering, and Information Technology & Electrical Engineering. Depending on previous study, this may be reduced to one year.

Electricity Market in the Master of Engineering

Description: The power industry is being deregulated world-wide and power engineers need knowledge of both power engineering and market issues to provide a linkage between engineers and economists/accountants. Graduates possess these skills, and are equipped for careers in Australia and around the world. Employment opportunities exist with traditional power companies, in addition to consulting firms and government agencies providing services for the broader energy market. This is currently the only such program offered in the Asia Pacific region. Students explore the most up to date knowledge through carefully designed and selected courses, and gain theoretical knowledge and hands on practical experience.

Comment: The proposed Master degree is more technical and although it covers briefly the electricity market, the UQ degree is not considered a competition but rather an alternative since no existing program offers technical depth equivalent to the one proposed here. This situation is going to change by the offering of the proposed Master degree as the market necessitates more technical depth from postgraduate programs.

Power Generation in the Master of Engineering

Description: The Master of Engineering (Power Generation) is offered by the University of Queensland together with Central Queensland University and Queensland University of Technology. The program provides post-graduate training for mechanical and electrical engineers working in the Queensland power generation industry.

Comment: This is by far a very specialised degree and does not present competition to the proposed Master degree which focuses on the understanding of the technical issues of the entire power industry, namely, generation, transmission, distribution and utilisation of electrical power.

Electrical Engineering in the Master of Engineering

Description: Courses cover traditional electrical areas such as power systems, electronics and signal processing, as well as more specialised areas, including biomedical, computer systems, radio frequency and microwave, software, telecommunications). Projects generally follow the research interests of staff. Current interests include power electronics; problems of power delivery in a deregulated environment; modelling of semiconductor devices; development of sensors for the mining industry; and the automated analysis of pathology slides. This broadly-based program extends graduate career opportunities in telecommunications, electronics, computer hardware, control systems or power systems. Graduates are also employed by companies varying from the large and long-established to small, new start-up companies.

Comment: This is a far too generic degree to present a competition for the proposed Master degree.

Queensland University of Technology

Master of Engineering Science (Electrical Engineering Studies)

Description: This course develops in-depth knowledge and research skills in computer engineering, communications engineering, and other areas of electrical and associate engineering disciplines. The student can broaden his/her knowledge in project management type units for mechanical and civil engineering courses or specialise in either computer or communications engineering or take subjects in both. The Computer Engineering stream covers important contemporary topics such as software development, computer networks and communications, real time operating systems, and application of computers in robotics, process

control, image processing and computer vision. The Communications Engineering stream covers advanced digital communications systems, and various applications.

Comment: This is a far too generic degree to present a competition for the proposed Master degree.

Master of Engineering Science (Electricity Supply Engineering)

Description: This course provides students with the skills and knowledge identified to meet industry competencies. QUT staff draws on the expertise of experienced engineers in industry to provide the high level of vocationally oriented training required by professional personnel in industry. (12 units are also available as distance education units.) In the Masters program students choose 18 units from list and complete 100 days of supervised professional practice and submit a thesis that makes a contribution to knowledge of professional practice that they have undertaken. Units are offered in block mode or by distance education. Block mode units are held twice yearly and distance education units are year round. Ad hoc Block modes units are also offered in Brisbane and throughout Australia and New Zealand in demand.

Comment: This is close to the Master program proposed here. However, there are issues that present obstacles to the one offered by QUT and the positioning of the proposed Master degree is more favourable and likely to be more attractive to students especially from overseas. The most important one is that the units are offered all over the place, including other Australian places and New Zealand diminishing the necessary and significant laboratory component substantially. It is believed that the QUT Master does not have the appropriate technical depth required for the industry. This is not going to be an issue with the proposed Master program as all units will be face-to-face and will have a significant laboratory component for such highly technical subject that is the power engineering subject.

Monash University, Melbourne

Master of Electrical and Computer Systems Engineering

Description: This program is intended to appeal both to recent graduates and professionals in the area of electrical and computer systems engineering. It aims to enhance students' first qualification with studies in electrical and computer systems engineering and improve their prospects in this area of sustained employment growth. The course provides a mix of units permitting students to develop an understanding of the interaction of the various layers of modern electrical and computer systems. All units in the course use case studies and exercises to build understanding of the concepts and theoretical principles. Among the studies are advanced control systems, advanced electronic and photonic devices, large scale digital design and an electrical and computer systems engineering project.

Comment: This is by far a generic Master degree to present any serious competition for the proposed Master program.

The University of New South Wales

Master of Engineering Science (Energy Systems)

Description: The University of New South Wales offers a number of Masters in the Electrical Engineering area as follows:

- Energy Systems
- Microelectronics
- Photonics
- Signal Processing
- Systems and Control

The Energy Systems Master program started some years back as a degree covering mostly renewable energy systems such as solar and has over the last year aimed at the Electrical Power Industry. The units taken to complete the Master program include:

- ELEC9201 Electrical Industry Plan & Economics
- ELEC9202 Power System Operation & Control
- ELEC9214 Power Systems Equipment
- ELEC9226 Electric Services in Building
- ELEC9231 Electrical Drive Systems
- ELEC9232 Motion Control Systems
- ELEC9233 Electrical Safety

Comment: The direction of the Master of Engineering Science with specialisation in Energy Systems at UNSW has changed recently, as mentioned earlier, in order to address the needs of the power industry. However, it is very strategic that the University of Sydney moves as quickly as possible to start offering the proposed Master and without any delay. The University of Sydney with the industry support for the Chair of Power Engineering (EnergyAustralia) would have increased leverage for students wishing to get more relevant units and education that is reviewed by the local power industry through the EIE School Foundation. This will be heavily marketed to employees of the power industry including engineers from EnergyAustralia who will be supported to take the program and also would be encouraged to choose the University of Sydney through employer based professional development programs. EnergyAustralia has a longstanding, strong and continuing relationship with the University of Sydney and this has significant market value as students need to see links with industry when choosing a University to study in power engineering. Moreover, with the upcoming development of a more modern and more advanced laboratory in power engineering at the University of Sydney, with the industry's support, the aim would be to position the University of Sydney and the power engineering field at the forefront of the developments not only in Australia but also overseas. This will allow the EIE School to continue to attract students from the Asia Pacific region.

Georgia Institute of Technology, Atlanta, USA

The School of Electrical and Computer Engineering at Georgia Institute of Technology offers a generic Master program in electrical engineering but has a strong academic and research presence in the power engineering field for many decades. The offerings at Georgia Institute of Technology will be used as a benchmark to the proposed Master program to ensure international competitiveness for the offering at the University of Sydney.

University of Waterloo, Ontario, Canada

The Department of Electrical and Computer Engineering at the University of Waterloo offer a Master of Engineering in Electric Power Engineering as a distance education. The issue with such approach is that the technical depth remains at theoretical level and it is hard to see such offering presenting a serious competition to the proposed Master program. However, it is important for the positioning of the proposed Master degree to monitor the developments of the UoW degree. This way we can improve the offerings at the University of Sydney for the future while maintaining the strongest possible laboratory component, a necessary part of the education and training in the field of power engineering.

The University of Manchester, United Kingdom

The newly formed University of Manchester has amalgamated UMIST and the Victoria University of Manchester. UMIST has brought to the new institution its traditionally strong presence in the field of power engineering. The offering of a Master degree in the UK by the University of Manchester will be used as a benchmark for the one proposed here.

(iii) Summary table of competitive offerings to proposed award course:

Institute	Competitive Offering	Additional information
The University of Queensland	<ul style="list-style-type: none"> • Electricity Market in the Master of Engineering • Power Generation in the Master of Engineering • Electrical Engineering in the Master of Engineering 	Too specialised or too generic to present a serious threat to the proposed one

Queensland University of Technology	<ul style="list-style-type: none"> • Master of Engineering Science (Electrical Engineering Studies) • Master of Engineering Science (Electricity Supply Engineering) 	Not presenting a serious threat to the proposed one
University of New South Wales	<ul style="list-style-type: none"> • Master of Engineering Science (Energy Systems) 	A serious threat that is addressed with this proposal
Monash University	<ul style="list-style-type: none"> • Master of Electrical and Computer System Engineering 	Not presenting a serious threat
The University of Western Ontario, Canada	<ul style="list-style-type: none"> • Master of Engineering in Electric Power Engineering 	To be used as a benchmark for the proposed one, especially the online delivery methods and market response to such technological approach for the delivery
Georgia Institute of Technology, Atlanta, USA	<ul style="list-style-type: none"> • Master of Electrical and Computer Engineering 	To be used as a benchmark for the proposed one
The University of Manchester	<ul style="list-style-type: none"> • Master of Power Engineering 	To be used as a benchmark for the proposed one

(iv) Estimated Student Demand

Estimated Student Demand	2008	2009	2010
Local fee-paying	20	25	30
International fee-paying	15	20	30
Estimated Total EFTSU	30	40	55
Lowest EFTSU for which course would be run	10	10	10

Estimated Full-time and Part-time Students	2008	2009	2010
Estimated number of Full-time students	30	40	55
Estimated number of Part-time students	5	5	5

Impact on students currently enrolled: The proposed course will have no impact on any other postgraduate offerings in the School of Electrical and Information Engineering, the Faculty and the University of Sydney whatsoever.

Enrolment Quotas:

Will quotas be set for the proposed award course or for any units of study within the award course?

For local fee-paying students

Yes Please specify N/A
 No

For international fee-paying students

Yes Please specify N/A
 No

1.2.4 Consultation and External References

Consultees	Date of consultation	Method of consultation	Type of supporting evidence provided
EnergyAustralia	December 2006, February and March 2007	Telephone discussion, emails, face-to-face	Letter of support forthcoming

		discussions, meetings	
Engineering Faculty	February and March 2007	Discussions	Letter of support forthcoming
Electrical and Information Engineering Foundation	February and March 2007	Telephone discussion, emails, face-to-face discussions	Letter of support forthcoming
Australian Power Institute	March 2007	Telephone discussion, emails	Letter of support forthcoming
Engineers Australia	March 2007	Telephone discussions, emails	Letter of support forthcoming

1.2.5 Course structure

Award Course	Length of candidature (years)	Type of Enrolment	
		Full-time	Part-time
Master of Engineering Studies (Power Engineering)	Minimum	1 year	1 1/2 year
	Maximum	1 1/2 year	3 year

(b) Minimum credit points required for completion of qualification: 48 credit points.

(c) Mode of delivery: Face-to-face teaching Distance education
Offshore delivery

Justification

As mentioned earlier, the proposed Master program aims to provide graduates with the strongest possible technical skills. To achieve this, a face-to-face method of instruction is deemed necessary. Moreover, a significant part of the degree studies includes laboratory and project based work that cannot be offered by any other method of delivery other than the face-to-face proposed.

(d) Does the course involve clinical or industrial placement/experience?
Yes No

(e) Please indicate what processes are in place to guarantee the quality of academic staffing, available resources for teaching and provision of adequate curriculum delivery, assessment and authentication of student work.

The processes which are in place to guarantee the quality of academic staffing, are based on the Engineering Faculty strategy in this area, namely, *recruit, develop and retain (through reward, recognition and support) our people*. Two recent academic appointments in the EIE School, a lecturer and a Chair Professorship support the power engineering field. Moreover a Sesqui lectureship will be advertised very soon to support the field even further. These appointments make available adequate resources for the teaching and delivery of the proposed curriculum.

The policies and procedures associated with assessment, as outlined by the University of Sydney will be followed to assess student work. This is a Master program and a professional approach to student work through project work, report writing, team work and presentations will also be heavily employed to ensure the skills of graduates are as strong as possible meeting the required standards as outlined in another section of this proposal. These skills also include technical skills.

1.2.6 Assessment procedures

Proposed Assessment Regime	Proportion of assessment	Use of external assessors/examiners (Yes/No) (if yes, please provide details)
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	regime (%)	
Final Examination	30	No
Practical – Laboratory Work	35	No
Projects	35	No

Justification

The field of power engineering requires strong technical skills and the proposed Master aims to address such need. The proposed Master avoids the use of computer simulation only, an approach used by most universities in this field, mainly due to the unavailability of power engineering laboratories. The University of Sydney has access to laboratories including high voltage laboratories (EnergyAustralia) and hence the proposed high percentage laboratory work. The level of study as a Master program and the specialisation requires a more professional approach to student work and learning experiences and hence the proposed part of project works at 35%. The final examination will be used as a classic tool to ensure student learning has reached acceptable level, although the 30% weight is relatively low to allow for more practical work and assessment to occur in the proposed program.

1.2.7 Student workload

(a)

Expected Workload	Total Time Expected (per credit point)
Lectures	18 minutes
Tutorials	10 minutes
Independent study	12 minutes
Reading and work for assessment	8 minutes
Project Work	30 minutes

(b) Provide an indication of how the academic course load including the weight given to any dissertation component compare with other similar course loads in the faculty/college/university.

This is similar to other Master of Engineering Studies degrees offered by the EIE School.

(c) What load for HECS and student load purposes should be given to each of the constituent parts or units making up the award course?

N/A

1.2.8 Attributes of graduates

<p>Research and Inquiry: Graduates of the University will be able to create new knowledge and understanding through the process of research and inquiry. This might be understood in terms of the following:</p> <ul style="list-style-type: none"> • be able to identify, define and analyse problems and identify or create processes to solve them • be able to exercise critical judgement and critical thinking in creating new understanding • be creative and imaginative thinkers • have an informed respect for the principles, methods, standards, values and boundaries of their discipline and the capacity to question these • be able to critically evaluate existing understandings and recognise the limitations of their own knowledge 	<p>Project based learning approaches will be used to teach most of the Master program, therefore directly contributing to the development of the student's research and inquiry attributes listed in the left section</p>
<p>Information Literacy: Graduates of the University will be able to use information effectively in a range of contexts. This might be understood as:</p> <ul style="list-style-type: none"> • recognise the extent of information needed • locate needed information efficiently and effectively 	<p>Industry standards and recent technical papers will be used as part of</p>

<ul style="list-style-type: none"> • evaluate information and its sources • use information in critical thinking and problem solving contexts to construct knowledge • understand economic, legal, social and cultural issues in the use of information • use contemporary media and technology to access and manage information 	<p>the teaching and activities in each unit, and this will assist the graduates to improve their information literacy skills as outlined in the left section</p>
<p>Personal and Intellectual Autonomy: Graduates of the University will be able to work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges. This might be understood in terms of the following:</p> <ul style="list-style-type: none"> • be intellectually curious and able to sustain intellectual interest • be capable of rigorous and independent thinking • be open to new ideas, methods and ways of thinking • be able to respond effectively to unfamiliar problems in unfamiliar contexts • be able to identify processes and strategies to learn and meet new challenges • be independent learners who take responsibility for their own learning, and are committed to continuous reflection, self-evaluation and self-improvement • have a personal vision and goals and be able to work towards these in a sustainable way 	<p>A questioning approach and the way projects and laboratory work will be run will assist the graduates to improve the personal and intellectual autonomy attributes as listed in the left section</p>
<p>Ethical, Social and Professional Understanding: Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities. For example:</p> <ul style="list-style-type: none"> • strive for truth, honesty, integrity, open-mindedness, fairness and generosity • acknowledge their personal responsibility for their own value judgements and behaviour • understand and accept social, cultural, global and environmental responsibilities • be committed to social justice and principles of sustainability • have an appreciation of and respect for diversity • hold a perspective that acknowledges local, national and international concerns • work with, manage, and lead others in ways that value their diversity and equality and that facilitate their contribution to the organisation and the wider community 	<p>The electrical power industry requires ethical, social and professional approaches and these will be instilled in the student work through the “real” industrial projects to be used for teaching and learning</p>
<p>Communication: Graduates of the University will use and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning. This might be understood in terms of the following:</p> <ul style="list-style-type: none"> • use oral, written, and visual communication to further their own learning • make effective use of oral, written and visual means to critique, negotiate, create and communicate understanding • use communication as a tool for interacting and relating to others 	<p>The project based approach will assist graduates to get communication skills at the highest possible level through their work on project definition, project documentation, project planning, presentations, team work that requires negotiation, critique and ways to relate to</p>

	other team members
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1.2.9 Transitional arrangements (for continuing students)

Last year of student intake under existing Resolutions: Local students N/A
International students N/A

Provisions in place for students enrolled under existing Resolutions: N/A

1.2.10 Course administration

Course to be administered by the following Faculty: Engineering & Information Technologies

- (a) Is there **shared teaching** with other Faculties?
Yes Please see below on provision of additional information.
No
- (b) Basis for the above allocation between faculties: N/A
- (c) Combined degree – inter-faculty arrangements: N/A
- (d) Is the proposed award course part of a **con-joint venture** with another institution?
No

1.2.11 Resolutions

- (a) Are there changes to the list of Degrees, Diplomas and Certificates conferred by your Faculty, as listed in the **Resolutions of the Senate** available in the **University Calendar**?
Yes *If yes, please complete Appendix 2.*
- (b) Will there be new Resolutions or changes to the existing **Resolutions of the Senate** for the proposed Coursework award course?
Yes *If yes, please complete Appendix 3.*
No
- (c) Will there be new Resolutions or changes to the existing **Faculty Resolutions** for the proposed award course?
Yes *If yes, please complete Appendix 4.*
No
- (d) Will there be changes to the academic dress due to the introduction of the proposed new award course?
Yes No

1.2.12 Quality assurance arrangements and plans

(a) Monitoring, measuring and achieving quality learning and teaching

Learning and teaching processes associated with the proposed Master of Engineering Studies (Power Engineering) will follow excellent existing structures already in place within the Faculty of Engineering and the School of EIE, in the same way as other Master of Engineering Studies delivered by the School of EIE, namely, Master of Engineering Studies in Network Engineering and Wireless Engineering.

Power Engineering is already a distinct teaching and research area within the School. The School has Teaching Area Meetings organized by the Discipline/Program Directors held at least twice a year. Teaching issues relevant to the area can arise from the Academic Policy Advisory Committee (APAC) or Staff-Student Liaison Committee meetings. Action taken is referred back to APAC, which is chaired by the School's Undergraduate Director, or the Head of School, for reporting at the Staff-Student Liaison Meetings.

Moreover, student feedback is widely used and takes the following forms:

- (1) Students can approach a unit coordinator/lecturer with criticisms or suggestions. The Unit coordinator/lecturer is responsible to take the matter to the APAC, where usually a delegated academic takes action and reports back to APAC.
- (2) At the School level, unit of study evaluation surveys are assessed by the Dean of Engineering, the Head of School and the academic concerned with the Head following up on action taken.
- (3) Staff-student liaison meetings are held each semester, and are attended by most academic staff teaching within the Master program as well as student representatives. Reports are produced prior to this Staff-student liaison meeting. The reports cover units of study that semester, and are detailed. The Head of School refers the comments to the relevant unit coordinator and responses are tabled at the following meeting.

The School also has a Teaching & Learning Director and regular meetings are held, with interface to the Faculty of Engineering's teaching and learning management, assessment and development structures.

Following the policy requirements, the mapping of our activities is as follows:

Monitoring of students' experiences of the teaching and learning of graduate attributes in their units of study through the Unit of Study Evaluation (USE) process.	This method will be used for the proposed Master program.
Monitoring of students' experiences of the teaching and learning of graduate attributes in their degrees and courses using the Student Course Experience Questionnaire (SCEQ)	This method will be used for the proposed Master program.
Monitoring of the (Management and Evaluation of Coursework Teaching) policy requirement for the integration of the revised generic attributes in the learning outcomes communicated to students in unit of study outlines.	This method will be used for the proposed Master program.
Monitoring of the (Assessment and Examination of Coursework) policy requirements relating to integration of generic attributes in assessment standards and tasks.	This method will be used for the proposed Master program.

(b) Reviewing content, delivery and Resolutions of the award course

Through its Electrical and Information Engineering Foundation, which has strong representation from power industries, the School of EIE regularly reviews its undergraduate and postgraduate programs, and the same process will be applied to the new Master of Engineering Studies in Power Engineering, to ensure a suitable academic standard with appropriate industry relevance. The specialisations are reviewed in rotation, and the proposed Master will be first reviewed in 2008.

Within the School, content, delivery and syllabus integration is reviewed at the Teaching Area coordination meetings and by APAC. APAC meets at least once per month and more frequently at times of program revision. APAC is the key forum for discussion and development of the School's teaching program improvements.

Engineers Australia, the professional body representing engineers, reviews all specialisations for Accreditation approximately every four years.

(c) Review and rationalise units of study for the award course

The Teaching Area Committee for Power engineering, chaired by the EnergyAustralia Chair, as well as APAC, will deal with the Power stream at the unit of study level.

SECTION 1: ACADEMIC BOARD COURSE PROPOSAL

PART 3: RESOURCE IMPLICATIONS

1.3.1 Estimated Student Numbers for next three years of the award course

Estimated Student Demand	2008	2009	2010
Estimated Student Numbers	35	45	65
Estimated EFTSU	30	40	55

1.3.2 Availability of teaching and support staff

- (a) Availability of academic and support staff to deliver the proposed award course:

There is sufficient number of academic staff within the School of Electrical and Information Engineering to deliver the units associated with the proposed Master of Engineering Studies degree in Power Engineering. Moreover, most of the units proposed as part of the Master of Engineering Studies in Power Engineering are also available and offered to the undergraduate students wishing to take them making a greater economy of scale. The IT and technical staff required to deliver the proposed course are also available in the School.

- (b) Strengths of the department/school/faculty:

The strength of the School in the power engineering field is building in a nice way, with two significant appointments at Lecturer level (May 2006) and the Chair Professor level (December 2006). The field of power engineering is a strategic area within the School for the near and long term future. Another position at Research Assistant Level will assist the teaching load, as the person to be appointed will take one unit for teaching per year.

1.3.3 Availability of teaching space, and other required facilities

- (a) Teaching rooms:

There are teaching rooms within the EIE School to facilitate the offering of the proposed degree.

- (b) Lecture theatres:

There are lecture theatres within the EIE School to facilitate the offering of the proposed degree.

- (c) Laboratories (including computer access labs):

There are existing laboratories within the EIE School that can support the proposed degree and the establishment of more advanced ones to be fully operational by the end of the year to support not only the new undergraduate degree in power engineering but also the proposed postgraduate degree.

- (d) Staff offices:

There is no issue with staff offices that need to be dealt with under the proposed degree. The Sesqui Lecturer in Power Engineering will be located in available office space in Electrical Engineering J03/J13, which has already been earmarked.

- (e) Storage or other space required including any which needs to be rented externally:

There is no need for extra space within the EIE School to support the proposed degree as the space available for the power engineering program is satisfactory.

1.3.4 Availability of Library Resources

There is nothing specific to the proposed degree that needs to be addressed and added to the holdings of the library. The existing library resources are deemed more than sufficient for the students to study for this program. The online journals are also adequate for the postgraduate students taking this course. Moreover, the IEEE Xplore is the single most powerful source of information that the students would need to access to find the latest developments in the field. This service is available through any computer within the University Campus as the University has an umbrella purchase of the service and makes it available to everyone without any specific needed for password or user access.

1.3.5 Availability of IT and other Equipment

(a) Computer Technology:

The computer hardware/software equipment is available within the School of EIE.

(b) Other Equipment: N/A

1.3.6 Timetabling arrangements

The proposed award course will be offered in the following teaching period:

standard non-standard teaching
(e.g. Summer School, Winter School)

APPROVALS

Nominated Faculty Officer

Dean of Faculty (or Delegate)

SECTION 1 – APPENDIX 2: RESOLUTIONS OF THE SENATE (DEGREES, DIPLOMAS AND CERTIFICATES)

Resolutions of the Senate (Degrees, Diplomas and Certificates)

SECTION 1 – APPENDIX 3: RESOLUTIONS OF THE SENATE (COURSEWORK AWARD COURSES)

Resolutions of the Senate (Coursework award courses)

Course Title: Master of Engineering Studies (Power Engineering)

1. These Resolutions must be read in conjunction with the *University of Sydney (Coursework) Rule 2000*, which sets out the requirements for all coursework courses, and the relevant Faculty Resolutions.
2. **Requirements for the [Award Course]**
 - 2.1 To qualify for the award of the [award course] a student must:
 - 2.1.1 complete successfully units of study giving credit for a total of 48 credit points; and
 - 2.1.2 satisfy the requirements of all other relevant By-Laws, Rules and Resolutions of the University.

SECTION 1 – APPENDIX 4: RESOLUTIONS OF THE FACULTY

Resolutions of the Faculty



University of Sydney

LIBRARY IMPACT STATEMENT

Proposed Award Course: Master of Engineering Studies (Power Engineering)

Abbreviated Name: MES (Power Engineering)

I have examined the Library needs related to the proposal and certify that existing Library holdings, staffing, services and accommodation are, or will be, adequate to cover the demands that are inherent in it.

Students will use resources and services via several of the University of Sydney Libraries including Engineering and Fisher Libraries, and will make extensive use of online resources. Students will use the new Scitech Library after the building is completed and collections consolidated in 2008.

Initially, the need to expand the collection will be minimal as the anticipated enrolment in 2008 is 40 students. To ensure that relevant resources continue to be available as the course develops it will be necessary for the Faculty to work closely with the Library to maintain the quality of the collection.

We look forward to working in partnership with the staff and students to support this course and develop training and services appropriate to their needs.

If, in the future, new Units of Study are developed within this program, or the Faculty intends delivering the program or Units within the program in a different mode, it is understood that the Library will be advised and will be asked to provide additional Library Impact Statements specific to the new Units.

A handwritten signature in cursive script, reading "Susan Hanfling".

.....
Susan Hanfling
Director, Sciences and Technology Libraries
for the University Librarian

Friday, 16th March, 2006

SECTION 2: FEE REVIEW AND FEE SETTING

Faculty: Engineering & Information Technologies

Department/School presenting the proposal: Electrical & Information Engineering

Faculty Contact person and/or: Professor Vassilios G. Agelidis **Ext. No:** 13446
Academic Proponent **E-mail:** v.agelidis@ee.usyd.edu.au

2.1.1 Type of proposal: **New**

2.1.2 Type of course: **Postgraduate Coursework**

2.1.3 Name of Award course(s)
Name of **New** Award course: Master of Engineering Studies (Power Engineering)

2.1.4 Abbreviated name
MES (Power Engineering)

2.1.5 Date of introduction or deletion
Introduced: Year 2008 Semester 1

2.1.6 Fee review and Fee-setting

Fees for Postgraduate award course:

Postgraduate award course	Current Fees (per 1 EFTSU per annum)		Proposed Increase (%)		Proposed Fees (per 1 EFTSU per annum)	
	Local students	International students	Local	Int'l	Local students	International students
MES Power Eng	18240	23049	5.6	5.6	19440	24480

PROPOSED BY:

Nominated Faculty Officer Dean of Faculty (or Delegate) **PVC (College)**

APPROVAL:

Deputy Vice-Chancellor (Academic & International) / Vice-Chancellor

SECTION 3: COURSE INFORMATION FORM AND MARKETING PLAN

PART 1: COURSE INFORMATION FOR FLEXSIS

Faculty: Engineering & Information Technologies

Department/School presenting the proposal: Electrical & Information Engineering

Faculty Contact person and/or: Professor Vassilios G. Agelidis **Ext. No:** 13446
Academic Proponent **E-mail:** v.agelidis@ee.usyd.edu.au

- 3.1.1 Type of proposal:** New
- 3.1.2 Type of course:** Postgraduate Coursework
- 3.1.3 Name of Award course(s)**
Name of **New** Award course: Master of Engineering Studies (Power Engineering)
- 3.1.4 Abbreviated name**
MES (Power Engineering)
- 3.1.5 Date of introduction or deletion**
Introduced: Year 2008 Semester 1
- 3.1.6 Course Code**
Course Code of Existing Award Course for amendment or deletion: to be obtained
- 3.1.7 CRICOS Code**
CRICOS Code of Existing Award Course for amendment or deletion: to be obtained
- 3.1.8 Short degree description (e.g. for the UAC Guide):**
- 3.1.9 Full degree description (e.g. for Faculty handbook):**
Master of Engineering Studies (Power Engineering)
- 3.1.10 Level of Award:**
Masters degree by coursework
- 3.1.11 Is this an Honours course?** No
- 3.1.12 If the proposal is for a new award course, please indicate if the new course is the result of new resolutions for an existing course?** Yes No
- 3.1.13 Name of award that will be conferred upon completion of course:**
Master of Engineering Studies (Power Engineering)
- 3.1.14 If the proposal is for a new award course, please indicate which category the proposed course should be allocated to according to the DEST Field of Education and Discipline Area (available from the [Courses and Fees Toolkit](#) on the Academic and International website):**
DEST Field of Education
DEST Discipline Area
- 3.1.15 Credit points required for the Award:** 48
- 3.1.16 Location/ Campus for Student Attendance:**
Camperdown & Darlington

3.1.17 Are students enrolling in the proposed award course subject to:

Criminal Record Check Yes No
 Prohibited Employment Declaration Yes No
 Health Records & Privacy Information Declaration Yes No

3.1.18 Prohibitions:

The maximum credit points per semester are set to 24.

3.1.19 Articulation Pathway (if applicable):

Course(s) to which this course articulates		Credit given in articulating course
Code	Name	
N/A	N/A	N/A

3.1.20 Units of Study offered in proposed award course:

(a). Existing units of study

UoS Code	UoS Name	Core / Elective	Session Offered	Course Year Offered
ELEC5204	Power Systems	Core	1	1
ELEC5203	Topics in Power Engineering	Core	2	1
ELEC5303	Computer Control System Design	Core	2	1
ELEC5701	Commercial Engineering Practice	Core	2	1
ELEC8900	Project Thesis	Core	1 & 2	1
ELEC5616	Computer and Network Security	Elective	1	1
ENGG5001	Professional Development	Elective	1	1

(b). New units of study

UoS Code	UoS Name	Core / Elective	Faculty	Australian Standard Classification Education (ASCED) Code	Session & Campus Offered	Credit Points
ELEC5205	High Voltage Engineering	Core	Engineering & Information Technologies		1, Darlington	6

SECTION 3: COURSE INFORMATION FORM AND MARKETING PLAN

PART 2: COURSE INFORMATION FOR UNIVERSITY'S UNDERGRADUATE AND POSTGRADUATE COURSE DATABASE (FOR MARKETING PURPOSES)

- 3.2.1** UAC Code: (Undergraduate courses only)
- 3.2.2** CRICOS Code: to be obtained
- 3.2.3** Career Opportunities: The graduates with the proposed Master will be able to work as electrical power generation, transmission and distribution engineers; as planning and maintenance engineers for the electric utility industry; as design and consulting engineers for the power industry.
- 3.2.4** Areas of study: Electrical and Power Engineering
- 3.2.5** Assumed Knowledge: A Bachelors degree in engineering or related field or Graduate Diploma in Engineering
- 3.2.6** Minimum education requirements:
- | | |
|------------------------|-------------------------------------|
| Bachelor degree (pass) | <input checked="" type="checkbox"/> |
| Bachelor (hons) | <input checked="" type="checkbox"/> |
| Graduate certificate | <input checked="" type="checkbox"/> |
| Graduate diploma | <input checked="" type="checkbox"/> |
- Additional information:
- 3.2.7** If the proposal is for a Postgraduate award course, please indicate the course method:
Coursework
- 3.2.8** UAI (for UG only): N/A
- 3.2.9** Additional admission selection criteria:
- 3.2.10** If the course is offered to international students please complete the following:
UAI International (for international students only): (Undergraduate courses only)
Other international student entry requirements: IELTS test results or equivalent
- 3.2.11** If the proposal is for a Postgraduate award course, please indicate the application closing date:
For local students, closing date for applications is
For international students, closing date for applications is
- 3.2.12** Will mid-semester intake be available for:
- | | | | | |
|-----------------------------------|-----|-------------------------------------|----|--------------------------|
| Commonwealth Supported students | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| Local fee-paying students | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| International fee-paying students | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |

SECTION 3: COURSE INFORMATION FORM AND MARKETING PLAN

PART 3: MARKETING PLAN

3.3.1 Marketing plan and strategy

The course will be marketing following its approval using a number of approaches as follows:

- Direct email to global listservers such as Powerglobe, serving the international power engineering community.
- A profile article will be sought for the Engineers Australia magazine to target potential engineers willing to upgrade their qualifications.
- A single page brochure will be designed for mailing to potentially new students.
- The website of EIE will be updated to reflect the availability of the new degree.
- An internal mail out to a number of companies that have engineers who could benefit from the degree will be done. These companies will include all the ones supporting the EIE Foundation and EnergyAustralia, the sponsor of the EnergyAustralia Chair of Power Engineering at the School of Electrical and Computer Engineering at the University of Sydney. Other companies will include Transgrid, Integral Energy, Delta Electricity to name just few. This is considered as the most direct way to attract potential students for the proposed degree.
- Mail course brochures to overseas institutions.
- Place course brochures in international conferences and events such as Engineers Australia meetings, IEEE meeting, IET meetings and other relevant events.

APPROVALS

Nominated Faculty Officer

Dean of Faculty (or Delegate)

SECTION 4: INTERNATIONAL STUDENT ADMINISTRATION REQUIREMENTS

Faculty: Engineering & Information Technologies

Department/School presenting the proposal: Electrical & Information Engineering

Faculty Contact person and/or: Professor Vassilios G. Agelidis **Ext. No:** 13446
Academic Proponent **E-mail:** v.agelidis@ee.usyd.edu.au

4.1.1 Type of proposal: **New**

4.1.2 Type of course: **Postgraduate Coursework**

4.1.3 Name of Award course(s)

Name of **New** Award course: Master of Engineering Studies (Power Engineering)

4.1.4 Abbreviated name

MES (Power Engineering)

4.1.5 Date of introduction

Introduced: Year 2008 Semester 1

4.1.6 Course Code

Course Code of Existing Award Course for amendment or deletion: to be obtained

4.1.7 CRICOS Code

CRICOS Code of Existing Award Course for amendment or deletion: to be obtained

4.1.8 Marketing plan and strategy

The course will be marketing following its approval using a number of approaches as follows:

- Direct email to global listservers such as Powerglobe, serving the international power engineering community.
- A profile article will be sought for the Engineers Australia magazine to target potential engineers willing to upgrade their qualifications.
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- The website of EIE will be updated to reflect the availability of the new degree.
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- Mail course brochures to overseas institutions.
- Place course brochures in international conferences and events such as Engineers Australia meetings, IEEE meeting, IET meetings and other relevant events.

4.1.9 Availability of Course

Will international students be able to enrol full-time?

Yes No

4.1.10 Mode of Study

Will international students be able to study the proposed course in "face-to-face" mode for at least 75% of the time each semester?

Yes No

4.1.11 Incidental (Ancillary) Fees

Will the proposed course incur any compulsory costs other than tuition fees and compulsory subscriptions?

No

4.1.10 Commencement Semester

Indicate whether entry to the course is possible in each semester.

SEM1 ONLY SEM1or 2 SEM2 ONLY

If entry is permissible in Semester 2, please indicate whether subject choice will be restricted and whether the duration of the course will necessarily increase?

N/A

4.1.11 English Language Requirements

Will the minimum English language requirement for the proposed course differ from the usual requirements (i.e. overall IELTS score of 6.5 with a minimum of 6.0 in each band)?

Yes

If yes please indicate IELTS equivalent

No

APPROVALS

.....

Dean or delegate

The Proposed Course is suitable for CRICOS registration and International Office processing.

.....

Director International Office

SECTION 5: PLANNING SUPPORT OFFICE

Faculty: Engineering & Information Technologies

Faculty Contact person and/or: Professor Vassilios G. Agelidis **Ext. No:** 13446
Academic Proponent **E-mail:** v.agelidis@ee.usyd.edu.au

5.1.1 Type of proposal: **New**

5.1.2 Type of course: **Postgraduate Coursework**

5.1.3 Name of Award course(s)

Name of **New** Award course: Master of Engineering Studies (Power Engineering)

5.1.4 Abbreviated name

MES (Power Engineering)

5.1.5 Date of introduction

Introduced: Year 2008 Semester 1

5.1.6 Estimated percentage distribution of load across departments in one or more faculties:

Faculty	Department	Estimated percentage of load
Engineering & Information Technologies	EIE	100

5.1.7 Number of semesters required to complete the course in minimum time

2

5.1.8 Estimated Student Enrolments (i.e. Head Count)

Estimated Student Enrolments		2008	2009	2010
Local fee-paying	Full-time	20	25	30
	Part-time	5	5	5
International fee-paying	Full-time	15	20	30
	Part-time	0	0	0
Total Student Enrolments		35	45	60

5.1.9 For undergraduate degrees only, please indicate the expected 'carry-on' rate from one academic year to the next.

N/A

APPROVALS

Nominated Faculty Officer

Dean of Faculty or delegate

Electrical and Information Engineering Foundation The University of Sydney

Postal Address: Electrical and Information Engineering Foundation, J03, University of Sydney NSW 2006
Tel: 9351 7171, Fax: 9351 7172, Email: eief@ee.usyd.edu.au, Web: www.ee.usyd.edu.au/foundation



20 March 2007

Professor V Agelidis
EnergyAustralia Chair in Power Engineering
School of Electrical and Information Engineering
J03
University of Sydney NSW 2006

Dear Vassilios,

Master of Engineering Studies in Power Engineering

I am writing to express the Foundation's support for the new Master of Engineering Studies in Power Engineering degree being proposed for the School of Electrical and Information Engineering.

During 2004 and 2005 the Foundation's **Power Industry Reference Group** met to consider the needs of the power industry.

The reference group heard that all the New South Wales power utilities had fallen behind in network capital expenditure over the last ten years. All the utilities reported government approval to undertake new major expenditures. The result was that, after several years of low demand for power engineers, there is now a critical shortage.

EnergyAustralia reported its intention to take on a large number of graduate engineers capable of being trained over a several year period to manage the organisation's systems. The company was planning to recruit 30 graduate engineers in both 2005 and 2006.

The reference group heard that demand for power in countries like India and Malaysia was growing at much higher rates than in Australia and that these countries would send students to Australia to study power engineering if the courses were available.

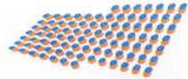
In response to the reference group's recommendations, EnergyAustralia and the University agreed, during 2005, to create the **EnergyAustralia Chair in Power Engineering** with significant funding from EnergyAustralia. I am happy to be able to say that, during 2006, Professor Vassilios Agelidis accepted the University's invitation to become the new EnergyAustralia Chair in Power Engineering.

The Foundation believes that the new chair plus the new Sesqui Lectureship in Power Engineering which commenced in 2006 - along with the proposed **Master of Engineering Studies in Power Engineering Degree** - will allow the University of Sydney to make a significant contribution to relieving the critical shortage of power engineers which our members have been telling us about for some time.

The Foundation's industry members strongly support the proposed degree.

Yours sincerely,

Michael B Dureau
President



EnergyAustralia™

145 Newcastle Road
Wallsend NSW 2287
Telephone 13 1525
+61 2 4951 9555

Address all mail to
PO Box 487
Newcastle NSW 2300
Australia

30 March 2007

Professor Vassilios Agelidis
Energy Australia Chair of Power Engineering
School of Electrical & Information Engineering
Building J03, Maze Crescent
Sydney University NSW 2006

Dear Vassilios

EnergyAustralia wishes to express its support for the introduction of the proposed Master of Engineering Studies (Power Engineering) at The Sydney University.

This course will meet a need that exists for post graduate studies in Power Engineering within our organisation, ensuring staff are adequately trained. In addition, EnergyAustralia will be offering financial support to staff enrolling in the course.

It is further anticipated that the course will appeal to other power companies and utilities who wish to further enhance the skills and knowledge of their staff.

Yours sincerely

Geoff Lilliss
Executive General Manager Network



Partner

	Unit of Study Template.
UoS Code	ELEC5205
UoS Title	High Voltage Engineering
Credit Points	6
Semester Offering	1
Precursor Units of Study, (Pre-requisites, <u>A</u> ssumed Knowledge) (<u>M</u> andatory, <u>R</u> ecommended)	P: ELEC3203 A: ELEC3105 R: ELEC5204
Co-requisite Units of Study	
Mutually Exclusive Units of Study	
UoS Coordinator	<ul style="list-style-type: none"> ▪ Vassilios G. Agelidis ▪ Department/School: EIE ▪ Room number 326 ▪ Phone: 9351 346 ▪ Fax: 9351 3847 ▪ Email: v.agelidis@ee.usyd.edu.au
Lecturers/ tutors /demonstrators	<ul style="list-style-type: none"> ▪ TBA
UoS Aims and Objectives	<p>1. What does this UoS aim to teach students?</p> <p>Understanding of fundamentals concepts associated with:</p> <ul style="list-style-type: none"> • Electromagnetic transients in power networks • High voltage equipment and its use in power systems • Overvoltage and overcurrent in electrical networks and mitigations techniques • Insulation of high voltage equipment and power system apparatus • Condition monitoring of power system apparatus <p>Exposure to several state-of the-art online monitoring techniques of power system apparatus such as transformers and switchgear will ensure that students have knowledge of the latest industrial solutions to the management of the problems associated with overvoltage and overcurrent and the protection mechanisms used.</p> <p>Student involvement with practical projects in the power engineering laboratory and the high voltage laboratory will expose them to the</p>

	<p>usage of simulators and actual equipment used by industry to assess the state of power equipment and its “health” as part of regular maintenance and monitoring methods.</p> <p>2. What Attributes (theoretical, practical) will this UoS try to develop/teach its students?</p> <p>Theoretically the students will be exposed to the mathematical modeling of transient phenomena in high voltage power systems. Practically the students will be exposed to the standard industrial methods of assessment used as part of monitoring of power system equipment.</p>
<p>Learning Outcomes</p>	<p>1. What outcomes do you expect students to achieve from this UoS?</p> <ul style="list-style-type: none"> • Ability to identify the main equipment used in power systems and especially in high voltage section of the network. • Understanding of the state-of-the-art solutions in the area of high voltage engineering including measuring and monitoring equipment. • Based on the above understanding, ability to analyse a given problem and devise approach and methodology in dealing with it in a systematic engineering way. • Familiarization with are program used in industry to analyse phenomena associated with high voltage equipment and its operation. • Familiarisation with laboratory measuring techniques and equipment used in actual industrial projects.
<p>Graduate Attributes</p>	<p>What are the Graduate Attributes that this UoS will teach students?</p> <p>Using project based learning and a professional laboratory environment the students will improve their skills and attributes in the following areas:</p> <p>Time management: students have to manage time and devise a plan to complete the project and laboratory work using time scheduling techniques and booking f the equipment in a professional way.</p> <p>Engineering argument: reasoning about methodology and approach towards a given project and justifying it will assist students develop a more rigorous analysis and synthesis technique towards a given engineering project and challenge</p> <p>Awareness of impact of a given solution to other parts of the network: the power network and associated problems cannot be dealt with at local level as they are likely to affect a significant part of the network. Power systems suffer form cascading effects and students need to assess their solutions against a system not necessarily a subsystem they are working on.</p> <p>information literacy: use of current technical literature and industrial standards</p> <p>research and inquiry: synthesis of knowledge from this and other UoS</p> <p>1. How will the Graduate Attributes be developed through the</p>

	<p>assessment methods and teaching methods specified above? For the project which forms a significant part of the unit's work, the students draw on the knowledge from other units and various forms of literature to deal with a problem which in all cases is a "real" case provided by industry. They are required to write a report and give a presentation.</p> <ul style="list-style-type: none"> • Teaching: Generic Attributes of Graduates Policy Type: Academic Approved By: Academic Board • www.itl.usyd.edu.au/GraduateAttributes/policy • www.itl.usyd.edu.au/GraduateAttributes/clusters • Teaching: Communication Skills of Students Policy Type: Academic Approved By: Academic Board
<p>Teaching and Learning Approach</p>	<ol style="list-style-type: none"> 1. Lecture and Lab (to assist with project work) 2. Why do you feel that this delivery approach is appropriate and will successfully develop student learning? <p>Basic concepts and issues of high voltage power systems, transient phenomena and associated equipment and operation will be presented in the lectures. However, the students will have the opportunity to test and experience some of these problems using hands-on work in the power engineering laboratory as well as the high voltage laboratory. By doing work in the actual laboratory environment is how students will learn the concepts.</p> <ul style="list-style-type: none"> • Teaching: Guidelines for Good Practice in Teaching and Learning Policy Type: Academic Approved By: Academic Board • Teaching: Quality Assurance and On-line Learning Policy Type: Academic Approved By: Academic Board <p>Recommended Reading and Textbooks for the UoS</p> <ol style="list-style-type: none"> 1. High Voltage Engineering, by M.S. Naidu and V. Kamaraju, McGraw Hill, 1996, ISBN 0-07-462286-2 2. High Voltage Engineering Fundamentals by E. Kuffel, W S Zaengl, J. Kuffel, Newnes, Reed Elsevier & Pergamon Press, 2001, ISBN 0-75063634-3 3. Advances in High Voltage Engineering (IEE Power and Energy) by M. Haddad (Editor), D. Warne (Editor), IEE, 2004, ISBN 0-85296-158-8 4. High Voltage Engineering & Testing (IEE Power & Energy Series, 32) by Hugh M. Ryan (Editor), IEE, 2001, ISBN 0-85296-775-6 5. Principles of High-Voltage Engineering, by Institute of Electrical and Electronics Engineers, 2000, ISBN-10: 0780362446, ISBN-13: 978-0780362444

Assumed Knowledge	Linear circuit theory and analysis, mathematical modeling of transmission lines, modeling of transformers, three-phase networks, transformer connections and filter theory.
Syllabus	<p>Electromagnetic transients. Cause of electromagnetic transients. Lighting, switching, faults. Impact on insulation levels for high-voltage equipment. Approaches to analysis – sources, switches, distributed and lumped components. Using the transients-analysis program ATP. Current research. Typical examples, including demonstration of migration methods: lightning impulse coming into a substation, the application of surge arresters, switching surges on EHV lines; the use of point-on-wave switching, insertion registers, transformer inrush and the effects on filters; capacitor switching, the use of point-on-wave control; fault current offset waveforms; transient recovery voltages for circuit breakers. High voltage components. This module provides coverage of the design, operation, testing and condition monitoring of high voltage electrical power system equipment and of the current research in high voltage. Causes and effects of overcurrent and overvoltage events. Overcurrent protection: circuit interrupters. Propagation of overvoltages on transmission lines and cables. Overvoltage protection. Design and limitations of insulation systems. Voltage and thermal rating of major equipment. Power and instrument transformers. On-line condition monitoring methods. Insulation assessment of major electrical plant. Earthing systems for equipment and personnel protection.</p>
Workload requirements	<ol style="list-style-type: none"> 1. Contact Hours: 1 2-hour lecture and 1 3-hour lab per week 2. What expectations do you have of your students in terms of their learning commitments to the ‘face-to-face’ teaching and any other learning methods? 3. Indication of the hours per week outside formal contact hours that will be expected in order to successfully complete assignments and study. 3-4 hours per week in the first half, 8-10 hours per week in the second half of the course (when the projects are given).
Assessment and/or Examination	<ol style="list-style-type: none"> 1. What types of assessments are going to be used in this UoS? Project report, student presentation and a final examination 2. How much weighting will each assessment have on the student’s final grade (approximately)? Final = 30% Presentation + project=30% Laboratory work = 30% 3. How will the assessment methods help students to achieve the UoS Aims, objectives and outcomes set?

	<p>4. How will the assessment methods build on the GA students develop in their previous UoS?</p> <p>5. Assessment Schedule</p> <ul style="list-style-type: none"> • presentation (week 12) • project (week 13) • examination (examination period) <p>6. Describe how students should expect to receive feedback in this UoS: Lecturer's assessment with extensive comments about project, lecturer's assessment/comments on presentation, tutor's comments, marks</p> <p>7. Describe ways and opportunities for students to give feedback on UoS, teaching, learning and other student concerns : emails, students/staff liaison meeting survey</p> <p>8. Duration of Final Exam: 3 hrs closed-book exam</p>
Relevance (Where this UoS will lead you)	<ul style="list-style-type: none"> ▪ State the follow-up UoS in which the concepts of this unit will be used and further studied
<p>Note : Academic Board policies apply to ALL Usyd UOS so maybe Just a reference to major ones and a reference to the policy web site is all that is required here.</p>	
Examination Policy	<ul style="list-style-type: none"> • Describe what students will be tested on in the final assessment in terms of how they can show that they have grasped the concepts within this UoS • Assessment: Assessment and Examination of Coursework Policy Type: Academic Approved By:Academic Board
Assessment Policy	<ul style="list-style-type: none"> • Assessment: Assessment and Examination of Coursework Policy Type: Academic Approved By:Academic Board
Academic Honesty	<ul style="list-style-type: none"> • University Policy on Academic Dishonesty • Assessment: Academic Honesty (Plagiarism) in Coursework Policy Type: Academic Approved By:Academic Board
Other University Policies	<ul style="list-style-type: none"> • Teaching: Generic Attributes of Graduates Policy Type: Academic Approved By:Academic Board • Admissions: Undergraduate Courses Policy Type: Academic Approved By:Academic Board • Courses: Creation, Variation and Deletion of Award Courses and Units of Study Policy Type: Academic Approved By:Academic Board • Teaching: Generic Attributes of Graduates Policy Type: Academic Approved By:Academic Board • Teaching: Communication Skills of Students Policy Type: Academic Approved By: Academic Board

	<ul style="list-style-type: none">• Teaching: Guidelines for Good Practice in Teaching and Learning Policy Type: Academic Approved By:Academic Board• Honours: Award with Honours Policy Type: Academic Approved By:Academic Board
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Electrical and Information Engineering Foundation The University of Sydney

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20 March 2007

Professor V Agelidis
EnergyAustralia Chair in Power Engineering
School of Electrical and Information Engineering
J03
University of Sydney NSW 2006

Dear Vassilios,

Master of Engineering Studies in Power Engineering

I am writing to express the Foundation's support for the new Master of Engineering Studies in Power Engineering degree being proposed for the School of Electrical and Information Engineering.

During 2004 and 2005 the Foundation's **Power Industry Reference Group** met to consider the needs of the power industry.

The reference group heard that all the New South Wales power utilities had fallen behind in network capital expenditure over the last ten years. All the utilities reported government approval to undertake new major expenditures. The result was that, after several years of low demand for power engineers, there is now a critical shortage.

EnergyAustralia reported its intention to take on a large number of graduate engineers capable of being trained over a several year period to manage the organisation's systems. The company was planning to recruit 30 graduate engineers in both 2005 and 2006.

The reference group heard that demand for power in countries like India and Malaysia was growing at much higher rates than in Australia and that these countries would send students to Australia to study power engineering if the courses were available.

In response to the reference group's recommendations, EnergyAustralia and the University agreed, during 2005, to create the **EnergyAustralia Chair in Power Engineering** with significant funding from EnergyAustralia. I am happy to be able to say that, during 2006, Professor Vassilios Agelidis accepted the University's invitation to become the new EnergyAustralia Chair in Power Engineering.

The Foundation believes that the new chair plus the new Sesqui Lectureship in Power Engineering which commenced in 2006 - along with the proposed **Master of Engineering Studies in Power Engineering Degree** - will allow the University of Sydney to make a significant contribution to relieving the critical shortage of power engineers which our members have been telling us about for some time.

The Foundation's industry members strongly support the proposed degree.

Yours sincerely,

Michael B Dureau
President



145 Newcastle Road
Wallsend NSW 2287
Telephone 13 1525
+61 2 4951 9555

Address all mail to
PO Box 487
Newcastle NSW 2300
Australia

30 March 2007

Professor Vassilios Agelidis
Energy Australia Chair of Power Engineering
School of Electrical & Information Engineering
Building J03, Maze Crescent
Sydney University NSW 2006

Dear Vassilios

EnergyAustralia wishes to express its support for the introduction of the proposed Master of Engineering Studies (Power Engineering) at The Sydney University.

This course will meet a need that exists for post graduate studies in Power Engineering within our organisation, ensuring staff are adequately trained. In addition, EnergyAustralia will be offering financial support to staff enrolling in the course.

It is further anticipated that the course will appeal to other power companies and utilities who wish to further enhance the skills and knowledge of their staff.

Yours sincerely

A handwritten signature in black ink, appearing to read "Lilliss".

Geoff Lilliss
Executive General Manager Network

