BAB I
PENDAHULUAN

1.1 Latar Belakang

Program Studi Magister Ilmu Lingkungan (PSMIL) merupakan salah satu program studi unggulan Program Pascasarjana Unud. PSMIL merupakan program studi magister bidang ilmu lingkungan pertama di Bali dengan ijin operasional Keputusan Direktur Jenderal Pendidikan Tinggi, Departemen Pendidikan Nasional Nomor 1866/D/T/2001 tertanggal 1 Juni 2001, dan terakreditasi dari BAN PT sejak tahun 2007 sesuai dengan Surat Keputusan (SK) Dirjen. Dikti. No. 005/BAN-PT/Ak-V/S2/II/2007, tertanggal 24 Februari 2007. Kenyataan tersebut menjadikan PSMIL sebagai pelopor dan telah menjadi salah satu program studi ilmu lingkungan terkemuka di Indonesia dan sedang berkembang menuju level international. Peminatnya terus meningkat dari tahun ke tahun menunjukkan antusiasme yang tinggi dan menjadi pilihan bagi calon mahasiswa sebagai tempat untuk menempuh ilmu di Program Magister Ilmu Lingkungan. PSMIL memiliki prospek lulusan yang baik dari sisi penyerapan oleh dunia kerja dan karir yang baik di tempat bekerja. Lokasi PSMIL PPs Unud di Denpasar merupakan lokasi yang sangat strategis, menjadikan PSMIL populer dengan menjadi tempat forum ilmiah bidang lingkungan di tingkat nasional dan international. PSMIL PPs Unud tengah berupaya terus meningkatkan mutu pembelajaran dan lulusan melalui kerjasama dengan berbagai pihak, baik dalam dan luar negeri.

Adanya perubahan paradigma pembelajaran menuju pembelajaran berbasis kompetensi menuntut PSMIL terus berbenah dan melakukan peningkatan mutu pembelajaran dengan melakukan kerjasama, terutama dengan institusi sejenis dalam level international.

Perkembangan pembangunan di segala bidang di berbagai pelosok cenderung mengeksploitasi sumberdaya alam berlebih, lahan produktif berkurang, pencemaran air dan udara, serta konflik antar sektoral. Kondisi ini menimbulkan tekanan, kerusakan lingkungan, termasuk isu global yaitu perubahan iklim yang berdampak terhadap pemanasan global (*global Warming*). PSMIL dengan misinya melahirkan sumberdaya manusia yang mampu memberi peran signifikan pada upaya-upaya pengendalian kerusakan lingkungan dengan tetap membangun secara berkelanjutan. Semakin banyak tenaga ahli lingkungan yang berwawasan global dengan alih teknologi akan semakin baik, sehingga

permasalahan tersebut dapat ditangani secara komprehensif. Dengan memperbesar manfaat dan memperkecil risiko, maka peningkatan kegiatan dan kelangsungan proses pembangunan akan dapat berlangsung secara berkelanjutan.

Dalam kerangka mempersiapkan sumberdaya manusia yang berwawasan global, dengan landasan kearifan lokal, Program Studi Magiser Ilmu Lingkungan Program Pascasarjana Universitas Udayana mejalin kerjasama dengan *Faculty of Engineering and Graduate School of Science and Engineering Yamaguchi University* dalam kolaborasi *Double Degree/Dual Degree Program*. Kerjasama dilaksanakan berdasarkan kesepakatan kerjasama antar kedua belah pihak yang dituangkan dalam *Memorandum of Understanding* (MoU) antara *Graduate School of Science and Engineering, Yamaguchi University-Japan* dengan Udayana *University*, Bali-Indonesia (Lampiran 1). Kesepakatan kerjasama ini telah ditandatangani pada awal tahun 2007. Program kerjasama antara kedua belah pihak dilakukan dalam berbagai bidang seperti penelitian dan pengajaran. Dalam bidang pendidikan, Progam Studi Magister Ilmu Lingkungan program Pascasarjana Universitas Udayana dilaksanakan dalam program mengajar bersama (*shared lecture*), dan *double degree program*. Teknis pelaksanaan kerjasama tersebut telah dituangkan dalam *Technical Academic Agreement* (TAA) yang ditandatangani oleh *Director of Graduate School of Science and Engineering, Yamaguchi University* dan *Director of Postgraduate Program Udayana University* pada tanggal 26 Agustus 2011 di *Yamaguchi University*, Jepang. Proses perwujudan kerjasama ini didukung pendanaannya oleh Program Beasiswa Unggulan dari Biro Perencanaan dan Kerjasama Luar Negeri, Kementerian Pendidikan dan Kebudayaan Republik Indonesia (BPKLN KEMDIKBUD RI) dalam bentuk program akselerasi *double degree*, dan pemberian beasiswa unggulan. MoU dan TAA disajikan pada Lampiran 1.

1.2 Tujuan

Pelaksanaan kerjasama *Double Degree Program* bertujuan untuk menghasilkan tenaga akademisi dan profesional yang mampu:

1) Berfikir secara analitis, sintetis, terbuka, dan berwawasan global serta dapat mengembangkan pengetahuan ilmu lingkungan bagi kesejahteraan masyarakat secara ilmiah;
2) Mengaplikasikan ilmu dan pengetahuan lingkungan dalam rangka mendukung pembangunan nasional yang berkelanjutan (*sustainable development*); dan

3) Mengungkapkan penampilan profesionalnya dalam spektrum yang lebih luas dengan mengkaitkan bidang ilmu atau profesi yang serupa, serta dapat bekerja sama lintas sektoral.

1.3 Akreditasi Program Studi Penyelengara

Program *Joint Degree* ini diselenggarakan oleh Program Studi Magister Ilmu Lingkungan (PSMIL) Program Pascasarjana Unud, dengan *Graduate School of Science and Engineering* Yamaguchi University. Kedua lembaga penyelenggaran tersebut telah mendapat akreditasi oleh intitusi pendidikan yang berwenang di masing-masing negara. PSMIL PPs Unud diselenggraakan berdasarkan ijin operasional Keputusan Direktur Jenderal Pendidikan Tinggi, Departemen Pendidikan Nasional Nomor 1866/D/T/2001 tertanggal 1 Juni 2001, dan telah diperpanjang melalui surat Direktorat Jenderal Pendidikan Tinggi No. 183/D/T/2008 pada tahun 2008, pada tahun 2010 melalui Surat Keputusan Rektor Universitas Udayana No. 3457/D/T/K-N/2010, tertanggal 18 Agustus 2010, berdasarkan Laporan Evaluasi Program Studi Berbasis Evaluasi Diri (EPSBED) PSMIL Unud. PSMIL PPs Unud telah mendapatkan akreditasi dari BAN-PT sejak tahun 2007 sesuai dengan Surat Keputusan Badan Akreditasi Nasional Perguruan Tinggi (BAN-PT) No. 005/BAN-PT/Ak-V/S2/II/2007, tertanggal 24 Februari 2007 (Dokumen ijin Operasional dan Akreditasi disajikan pada Lampiran 2).

Yamaguchi University merupakan salah satu Perguruan tinggi ternama di Jepang. *Graduate School of Science and Engineering,* merupakan salah satu departemen di *Yamaguchi University* yang didukung oleh 73 guru besar (*full professors*), dan dengan kurikulum yang kompeten, menjadikan program ini menjadi salah satu Universitas Nasional ternama di Jepang. *Graduate School of Science and Engineering* merupakan merupakan salah satu pioner program keteknikan di Asia Timur.

Civil and Environmental Engineering merupakan salah satu Departemen di *Graduate School of Science and Engineering* yang telah mendapatkan pengakuan sebagai Departemen yang bertaraf Internasional dari Japan Acreditation Board for Engineering Education (JABEE) (Lampiran 4, Yamaguchi University, Introduction to Faculty of Engineering and Graduate School of Science and Engineering hal. 4). Dengan pengakuan ini lulusan dari *Department* ini telah mendaptakan pengakuan dari asosiasi Ahli Teknik (*Gijutsu Shiho*).

1.4 Gelar (*Degree*)

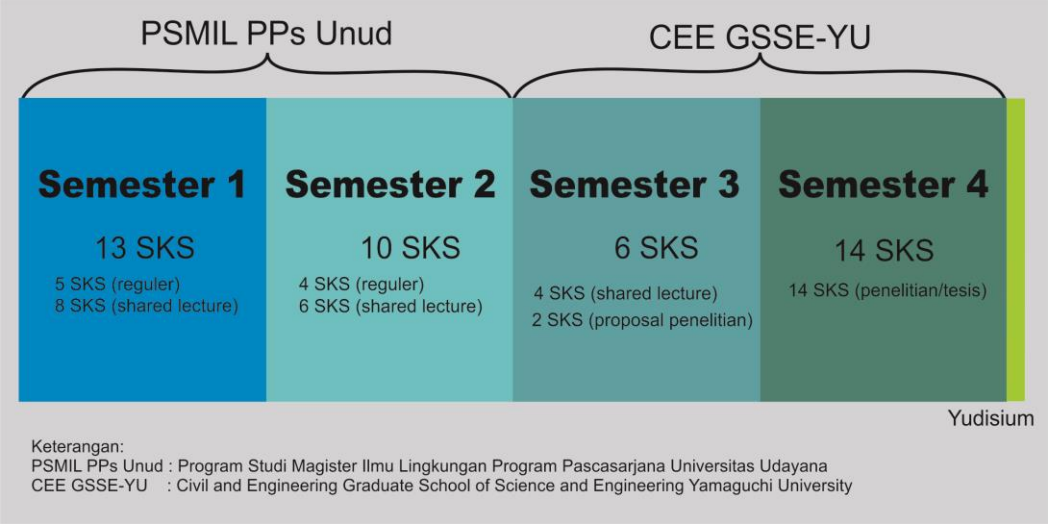
Peserta Program *Joint Degree* Antara PSMIL Unud dengan *Graduate School of Science and Engineering Yamaguchi University* akan memperoleh dua

gelar setelah menyelesaikan program tersebut. Gelar Magister Sains (M.Si) dari Program Studi Magister Ilmu Lingkungan PPs Unud, dan Master of Engineering (M.Eng) dari *Graduate School of Science and Engineering* Yamaguchi University. Pemberian gelar tersebut telah tertuang dalam *Techical Academic Agreement* antara Direktur Program Pascasarjana Unud dengan *Director of Graduate School of Science and Engineering Yamaguchi University* (Lampiran 1). Sejalan dengan raihan dua gelar tersebut, lulusan peserta *Joint Degree* akan mendapat dua ijasah/Diploma dan juga Transkrip Nilai (*Diploma Supplement*) baik dari Unud maupun Yamaguchi University. Ijasah/Diploma dari Universitas Udayana ditandatangani oleh Rektor, dan Transkrip Nilai yang ditandatangani oleh Direktur Program Pascasarjana, sedangkan dari Yamaguchi University, Ijasah dan Transkrip Nilai di tandatangani oleh *Director* of *Graduate School of Science and Engineering Yamaguchi University*. Contoh Ijasah/Diploma dan Transkrip Nilai/Diploma Supplement dari masing-masing universitas disajikan pada Lampiran 3.

1.5 Proses Pembelajaran

Peserta *Joint Degree* akan mengikuti perkuliahan di dua Universitas yaitu Unud dan Yamaguchi University. Tahun pertama mahasiswa akan mengikuti perkuliahan di Program Studi Magister Ilmu Lingkungan PPs Unud, dan pada Tahun kedua di Department of *Civil and Environment Engineering*, *Graduate School of Science and Engineering Yamaguchi University*-Jepang. Untuk Penyelesaian program *joint degree*, pada semester 1 dan 2, mahasiswa harus menyelesaikan mata kuliah inti dengan total kredit 23 SKS di PSMIL-PPs Unud, sedangkan pada semester 3 dan 4 mahasiswa harus menempuh mata kuliah pendukung penelitian (pilihan), penyusunan proposal, penelitian hingga ujian akhir tesis di Yamaguchi University. Proses pembelajaran di PSMIL dilaksanakan dengan melakukan 14 kali tatap muka, dua kali ujian (ujian tengah dan akhir semester), serta penugasan lainnya guna menunjang tercapainya kompetensi (topik bahasan) mata kuliah. Selain itu, juga ditunjang dengan melakukan praktikum di lapangan maupun di laboratorium. Dari total SKS yang harus diselesaikan tersebut, terdapat 10 mata kuliah yang sama antara di PSMIL PPs Unud dengan *Departement of Civil and Environment Engineering Graduate School of Science and Engineering Yamaguchi University.* Ke-10 mata kuliah tersebut diselenggarakan dalam bentuk *Shared Lecture Program (SLP).* SLP tersebut didukung oleh media *teleconference* yang menghubungkan dosen dan mahasiswa di Unud-Bali, Indonesia dengan Yamaguchi University-Ube, Japan.

Tesis merupakan salah satu syarat untuk menyelesaikan Program Magister, baik di PSMIL-PPs Unud, maupun di *Departement of Civil and Environment Engineering Graduate School of Science and Engineering Yamaguchi University*. Tesis disusun pada semester 4 yang di akui di kedua universitas. Skema proses pendidikan disajikan Pada Gambar 1.



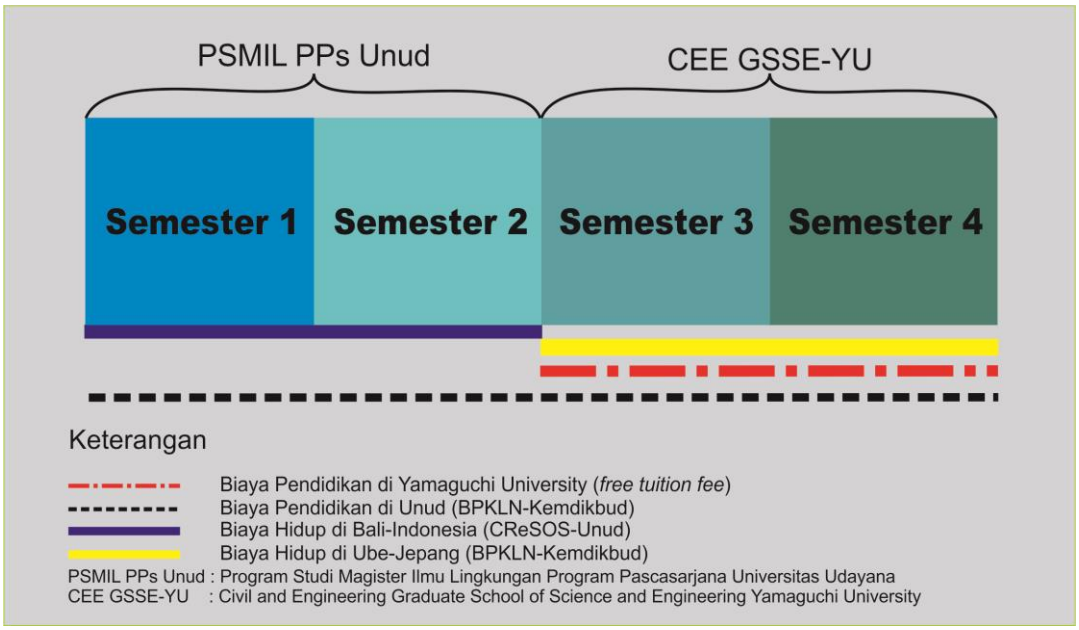
Gambar 1
Skema proses pembelajaran program *joint degree* Program Studi Magister Ilmu Lingkungan PPs Unud dengan *Civil and Environmental Engineering Department*, *Graduate School of Science and Engineering Yamaguchi University*

Mahasiswa yang menempuh program *Double Degree* Unud-Yamaguchi University harus menyelesaikan beban kredit total sebanyak 40-45 SKS, yang ditempuh pada Program Magister Ilmu Lingkungan Program Pascasarjana Universitas Udayana dan *Civil and Environmental Engineering Department*, *Graduate School of Science and Engineering Yamaguchi University*.

1.6 Pembiayaan

Pembiayaan terhadap penyelenggaraan Program Beasiswa Ungulan mendapat dukungan dari berbagai pihak. Dukungan tersebut dilakukan dalam share/pembagian dukungan keuangan, sehingga tidak terjadi tumpang tindih pembiayaan. Untuk biaya pendidikan di Universitas Udayana, dan biaya hidup mahasiswa selama menempuh studi di Jepang, sepenuhnya didukung oleh Program Beasiswa Unggulan BPKLN Kemdikbud, sedangkan biaya hidup selama menempuh studi di Universitas Udayana-Bali, didukung oleh *Centre for remote Sensing and Ocean Science* Universitas Udayana (CReSOS-Unud). Untuk biaya pendidikan di Yamaguchi University, ditanggung oleh Yamaguchi University (*free tuition fee*). Skema pembiayaan program *Joint Degree/Double Degree* PSMIL

Unud dengan *Graduate School of Science and Engineering Yamaguchi University* disajikan pada Gambar 2.



Gambar 2.
Skema pembiayaan program *Joint Degree/Double degree* PSMIL Unud dengan *Civil and Environmental Engineering Department, Graduate School of Science and Engineering Yamaguchi University*

1.7 Keberlanjutan

1.7.1 Keberlanjutan program

Meningkatkan mutu pendidikan di PSMIL salah satunya melakukan kerjasama dengan berbagai pihak terutama perguruan tinggi terkait di luar negeri sudah menjadi komitmen PSMIL yang tertuang dalam *roadmap* tahun 2009 yaitu membangun kemitraan dan kerjasama luar negeri. Implementasi dari *roadmap* tersebut pengelola PSMIL secara aktif melakukan terobosan kerjasama dengan perguruan tinggi luar negeri. Khususnya kerjasama yang dilakukan dengan Yamagucy University Jepang telah dirintis tahun 2007 dengan Sit in program, *penelitian bersama, share lecture hingga berhasil dalam pelaksanaan double* degree yang dimulai tahun 2011. Keberlanjutan kerjasama dengan *Yamagucy University* tersebut akan dijamin keberlanjutannya dengan kesepakatan periode kerjasama tahap I, evaluasi tahunan serta terlaksanannya kegiatan yang berkelanjutan untuk mengisi program kerjasama yang telah disepakati serta menjamin mutu pengelolaan kerjasama untuk mendapat pengakuan dari BKLN Kemdikbud maupun pihak lainnya (Lampiran 1.a). Pada dasarnya strategi PSMIL dalam menjaga keberlanjutan kerjasama adalah secara aktif melakukan interaksi serta mengisi program kerjasama dengan berbagai

aktivitas yang mungkin dapat dilakukan terutama alih teknologi dan *sharing* sumberdaya.

Selain dengan pihak YU, PSMIL juga pro aktif melakukan penjajakan kerjasama dengan PT lain di luar negeri seperti dengan Chiba University. Hal ini dilakukan untuk memberikan kesempatan lebih banyak mahasiswa PSMIL dapat mengenyam pendidikan pada PT luar negeri yang maju, menghasilkan karya-karya ilmiah international baik dari mahasiswa maupun dosennya. Peningkatan mutu pendidikan di PSMIL akan terjadi sesuai dengan visi dan misi serta penjabarannya dalam *roadmap* PSMIL.

1.7.2. Keberlanjutan Menempuh Studi

Pada saat ini, terdapat tiga orang alumni S2 PSMIL Unud yang sedang mengambil program S3 di Yamaguchi University, yaitu I Gede Hendrawan, S.Si, M,Si, I Ketut Swardika, ST, M.Si dan I Dewa Nyoman Nurweda Putra, S.Si, M.Si. Selain itu, sebanyak 8 orang mahasiswa juga mendapatkan kesempatan untuk mengikuti *research program* yang didampingi oleh dua orang *visiting professor* (Prof. Ir. M. Sudiana Mahendra, MAppSc, PhD dan Ass. Prof. Dr. Takahiro Osawa). Dari program *Double Degree* yang telah berlangsung saat ini diharapkan agar mampu diterima untuk melanjutkan program S3 di Yamaguchi University (Lampiran 1.a dan 1,b).

1.8 Lain-lain

1.8.1 Hak dan kewajiban kedua belah pihak, serta *reciprocal mechanism*.

Hak dan kewajiban dari keduabelah pihak serta *reciprocal mechanism* tertuang dalam Technical *Academic Agreement* (TAA) antara *Graduate School of Science and Engineering, Yamaguchi University* dengan program Pascasarjana Universitas Udayana untuk *double degree program* (lampiran 1.d), khususnya pada pasal 2 ayat 5, pasal 3, dan pasal 8.

1.8.2 Kepemilikan Hak Cipta Kurikulum, HAKI,Legalisasi Ijasah

Kepemilikan hak cipta kurikulum, HAKI, dan legalisasi Ijazah belum diatur dalam *Technical Academic Agreement.* Terkait dengan hal ini, telah dilakukan komunikasi dengan pihak Yamaguchi University (Lampiran 1.e). Dari hasil komunikasi tersebut disebutkan bahwa untuk universitas-universitas Jepang, belum ada laporan yang menyebutkan pengaturan kepemilikan hak cipta kurikulum, HAKI, dan legalisasi ijazah, sehingga akan diatur dalam *agreement* lebih lanjut.

BAB II

PROFIL UNIVERSITAS PENYELENGGARA

2.1 Universitas Udayana

A. Universitas Udayana

Universitas Udayana (Unud) berdiri secara resmi pada tanggal 17 Agustus 1962 dengan Surat Keputusan Menteri Perguruan Tinggi dan Ilmu Pengetahuan Nomor 104 tanggal 9 Agustus 1962 dan selanjutnya diperkuat oleh Surat Keputusan Presiden Republik Indonesia Nomor 18 tanggal 31 Januari 1963. Pada awal sejarahnya, Universitas udayana didukung oleh empat fakultas yaitu Fakultas Sastra (FS), Fakultas kedokteran (FK), Fakultas Kedokteran Hewan dan Peternakan (FKHP), dan Fakultas Keguruan dan Ilmu Pendidikan (FKIP). Sementara itu, sebenarnya Fakultas Sastra telah lahir terlebih dahulu dari pada Universitas Udayana, yaitu pada tanggal 29 September 1958. Pada waktu itu, FS merupakan bagian dari Universitas Airlangga Surabaya yang bernama Fakultas Sastra Udayana, namun setelah diintegerasikan ke dalam Universitas Udayana, namanya berubah menjadi Fakultas Sastra Universitas Udayana.

Pada tahun 1963, Fakultas Keguruan dan Ilmu Pendidikan di Indonesia menjadi Institut Keguruan dan Ilmu pendidikan (IKIP). Karena perubahan tersebut, FKIP tidak lagi menjadi bagian Universitas Udayana, namun bernauh di bawah IKIP Malang Cabang Singaraja. Oleh karena itu, sejak tahun 1963 Universitas hanya didukung oleh tiga fakultas. Dalam perkembangan selanjutnya, Unud secara berturut-urut berhasil mendirikan Fakultas Hukum dan Pengetahuan Masyarakat (FHPM) pada tahun 1964, Fakultas Teknik pada tahun 1965, serta Fakultas Ekonomi dan Fakultas Pertanian pada tahun 1967. Pada tahun 1968, IKIP Malang Cabang Singaraja kembali bernaung di bawah Unud dan menjadi dua fakultas yaitu Fakultas Keguruan (FKG), dan Fakultas Ilmu Pendidikan (FIP) melalui SK Dirjen Pendidikan Tinggi Nomor 16 tahun 1967.

Selaras dengan perkembangan itu, maka sejak tahun 1968 Universitas Udayana mempunyai Sembilan Fakultas. Pertumbuhan dan Perkembangan berbagai fakultas tersebut tidak sama. Fakultas Pertanian dan Fakultas Ekonomi sejak didirikan tahun 1967 hingga tahun 1975 belum diijinkan menamatkan

sarjana (S1), akan tetapi terbatas pada jenjang Sarjana Muda, dan baru mulai tahun 1976 kedua fakultas tersebut dapat menamatkan sarjana. Fakultas Kedokteran Hewan dan Peternakan sampai tahun 1978 baru mampu membina bidang ilmu peternakan saja. Demikian pula dengan FHPM sampai tahun 1978 baru mampu mengemban bidang Ilmu hukum saja.

Dengan keluarnya peraturan Pemerintah No. 5 tahun 1980, yang peraturan pelaksanaannya berupa Keppres No 62 tahun 1980 dan Keputusan Menteri Pendidikan dan Kebudayaan No. 0148/0/1983, maka fakultas-fakultas di Universitas udayan ditata kembali dan mengalami penciutan menjadi delapan fakultas yaitu Fakultas Sastra, Fakultas Kedokteran, Fakultas Peternakan, Fakultas Hukum, Fakultas Teknik, Fakultas Pertanian, Fakultas Ekonomi, dan Fakultas Keguruan dan Ilmu Pendidikan. Sementara itu, menghadapi perkembangan kebutuhan pembangunan daerah dan nasional, telah didirikan sejumlah program studi yang melaksanakan program pendidikan S1 dan sejumlah pendidikan non gelar (S0). Program pendidikan yang telah didirikan adalah:

- Program Studi Kedokteran Hewan (PSKH) didirikan pada tahun 1983 dan melaksanakan program pendidikan S1, berada di bawah Rektor;
- Program Studi Seni Rupa dan Disain (PSSRD) didirikan tahun 1983 melaksanakan program pendidikan S1, berada di bawah Rektor;
- Program Studi Teknologi Pertanian (PSTP) didirikan tahun 1984, melaksanakan program pendidikan S1, di bawah Fakultas Pertanian, kemudian berada dibawah Rektor.
- Program Studi Teknik Mesin dan Program Studi Teknik Elektro didirikan pada tahun 1984, dan melaksanakan pendidikan S1bernaung di bawah FT;
- Program Studi Matematika dan Ilmu Pengetahuan Alam (PSMIPA) didirikan tahun 1984 yang meliputi PS Kimia, PS Fisika, dan PS Biologi serta melaksanakan pendidikan jenjang S1. Pada tahun 1989, PSMIPA Unud mengalami pemekaran menjadi program studi yang berdiri sendiri dan untuk sementara langsung bernaung di bawah Rektor yang tetap melaksanakan pendidikan jenjang S1. Program Studi tersebut adalah PS Kimia, PS Fisika, dan PS Biologi.

- Program Studi Ilmu Kepariwisataan (PSIK) didirikan tahun 1985; melaksanakan progam S1, tetapi melaksanakan program S0 di bawah FS, maka namanya menjadi Program Studi Diploma 4 Pariwisata sejak 1989, berada langsung di bawah Rektor;
- Politeknik Unud didirikan pada tahun 1987, dan melaksanakan program pendidikan D2 Teknologi dan D3 Tata Niaga. Pada tahun 1997 Politeknik berdiri sendiri dengan nama Politeknik Negeri Bali;
- Program Studi Akuntansi didirikan tahun 1989, dan melaksanakan Program pendidikan S1, bernaung di bawah FE; dan
- Program Diploma Akuntansi dan keuangan didirikan pada tahun 1984, dan melaksanakan program pendidikan S0 bernaung di bawah FE. Sejak tahun 1990 kedua program studi tersebut menjadi program studi D3.

Pada tahun 1993, FKIP memisahkan diri dari Unud untuk menjadi Sekolah Tinggi Keguruan dan Ilmu Pendidikan (STKIP) di Singaraja. Dengan diberlakukannya Undang-Undang No 2 tahun 1989 tentang Sistem Pendidikan Nasional dan Peraturan Pemerintah No 30 tahun 1990 tentang Pendidikan Tinggi, maka struktur organisasi Unud secara bertahap disesuaikan dengan isi Undang-Undang dan Peraturan Pemerintah itu. Dalam bulan Oktober 1993 secara resmi PSMIPA berubah status menjadi Fakultas Matematika dan Ilmu Pengetahuan Alam (FMIPA) untuk dapat menampung PS Fisika, Kimia, Biologi, dan PS Matematika, menyusul PSKH resmi menjadi Fakultas Kedokteran Hewan (FKH). Sementara itu, status PS Teknologi Pertanian menjadi Fakutas Teknologi Pertanian (FTP), Program Seni Rupa dan Disain diitegrasikan dengan Sekolah Tinggi Seni Indonesia (STSI) Denpasar dan statusnya meningkat menjadi Institut Seni Indonesia (ISI) Denpasar. Dengan terpisahnya FKIP, Politeknik dan PSSD dari Unud, dan berdiirinya beberapa fakultas baru, maka saat ini Universitas Udayana memiliki 12 fakultas sebagai berikut:

1. Fakultas Sastra;
2. Fakultas Kedokteran;
3. Fakultas Peternakan;
4. Fakultas Hukum;
5. Fakultas Teknik;

6. Fakultas Ekonomi;
7. Fakultas Pertanian;
8. Fakultas MIPA;
9. Fakultas Kedokteran Hewan;
10. Fakultas Pariwisata;
11. Fakultas Teknologi Pertanian; dan
12. FISIP.

Visi Universitas Udayana

Terwujudnya lembaga pendidikan tinggi yang menghasilkan sumberdaya manusia unggul, mandiri dan berbudaya.

Misi Universitas Udayana

1. Menyelenggarakan pendidikan yang bermutu dan menghasilkan lulusan yang memiliki moral dan integritas yang tinggi sesuai dengan tuntutan masyarakat;
2. Mengembangkan penelitian dan pengabdian kepada masyarakat sesuai dengan kepentingan masyarakat dan bangsa; dan
3. Memberdayakan Unud sebagai perguruan tinggi yang berlandaskan pengembangan Ipteks dan nilai budaya.

B. Progam Pascarjana

Universitas Udayana yang lahir pada 29 September 1962 diawali dengan berdirinya Fakultas Sastra Udayana Cabang Universitas Airlangga pada 29 September 1958. Tiga Fakultas yaitu Fakultas Sastra (FS), Fakultas kedokteran (FK), dan fakultas Kedokteran Hewan dan Peternakan (FKHP), terbentuk pada saat awal berdirinya Universitas Udayana. Sampai saat ini Universitas Udayana telah memiliki 12 fakultas. Pada 6 Oktober 1992, Universitas Udayana dipercaya oleh Departemen pendidikan dan Kebudayaan Republik Indonesia, melalui Direktorat Jenderal Pendidikan Tinggi untuk menyelenggarakan pendidikan setrata dua (S2), diawali dengan berdirinya Program Studi Magister Linguistik. Hingga saat ini, Program Pascasarjana Unud telah memiliki 24 Program Studi Magister (S2), dan 7 Program Doktoral (S3). Program Studi yang terdapat di Universitas Udayana selengkapnya disajikan pada Tabel 1.

Tabel 1. Program Doktor dan Studi Magister Program Pascasarjana Universitas Udayana

No	Nama Program Studi	Konsentrasi
I.	**Program Doktor**	
1	Ilmu Linguistik	a. Wacana Sastra b. Linguistik Murni
2	Ilmu Kedokteran	a. Ilmu Kedokteran Biomedik b. Ergonomi Fisiologi Kerja c. Fisiologi Olahraga
		d. Ilmu Kedokteran Reproduksi e. Ilmu Kedokteran Dasar f. Ilmu Kedokteran Klinik g. Ilmu Kesehatan Masyarakat h. Ilmu Kedokteran Hewan
3	Kajian Budaya	a. Estetika dan Budaya Industri b. Kapita Selekta Politik Indonesia c. Kapita Selekta Ekonomi Indonesia
4	Ilmu Pertanian	a. Pengelolaan Sumberdaya Hayati Pertanian b. Pengelolaan Sumberdaya Air dan Lahan
		c. Agroekoteknologi
		d. Agribisnis e. Teknologi Pertanian
5	Ilmu Ekonomi	-
6	Ilmu Peternakan	-
7	Pariwisata	-
II.	**Program Magister**	
1	Ilmu Linguistik	a. Linguistik Murni b. Wacana Sastra (Wacana Naratif) c. Penerjemahan d. Pembelajaran dan Pengajaran Bahasa
2	Kajian Budaya	a. Pengembangan dan Pengendalian Sosial b. Pariwisata Budaya c. Estetika
3	Ergonomi-Fisiologi Kerja	-
4	Fisiologi Olahraga	a. Fisiologi Olahraga b. Fisioterapi
5	Ilmu Hukum	a. Hukum dan Sistem peradilan Agama b. Hukum Adat dan Masyarakat c. Hukum Pemerintahan d. Hukum bisnis
6	Manajemen	a. Manajemen Pemasaran b. Manajemen Keuangan c. Manajemen Sumberdaya Manusia d. Manajemen Bisnis Pariwisata

No	Nama Program Studi	Konsentrasi
7	Bioteknologi Pertanian	-
8	Pertanian Lahan Kering	Pertanian Organik
9	Ilmu Biomedik	a. Ilmu Kedokteran Reproduksi b. Anti A*ging Medicine* c. Ilmu Kedokteran Dasar d. *Combined Degree* Pendidikan Spesialis
10	Kajian Pariwisata	a. Sosiologi Budaya Pariwisata b. Perencanaan dan Pengembagan Kawasan Pariwisata
11	Ilmu Ekonomi	a. Pembangunan Daerah b. Keuangan Daerah c. Moneter Keuangan d. Ekonomi Industri
12	Ilmu Lingkungan	a. Lingkungan Pesisir b. Biologi Kelautan dan Perikanan *c. Environmental Remote Sensing*
13	Agribisnis	a. Manajemen Agribisnis b. Ekonomi Pembangunan Pertanian c. Pengembangan Masyarakat Agribisnis
14	Ilmu Peternakan	
15	Teknik Sipil	a. Struktur b. Geoteknik c. Teknik dan Manajemen Sumberdaya Air d. Manajemen Proyek Konstruksi e. Transportasi
16	Akuntansi	a. Akuntansi Keuangan dan Auditing b. Sektor Publik c. Akuntansi Manajemen
17	Teknik Arsitektur	a. Perencanaan dan Manajemen Pembangunan Desa dan Kota b. Manajemen Konservasi c. Kajian Lingkungan Binaan Etnik
18	Teknik Elektro	a. Manajemen Energi b. Manajemen Sistem Informasi dan Komputer
19	Kimia Terapan	Kimia Terapan
20	Teknik Mesin	Teknik Mesin
21	Ilmu Kesehatan Masyarakat	a. Umum b. Kesehatan Iba-Anak dan KIA-Kespro c. Epidemiologi Lapangan
22	Ilmu Biologi	-
23	Kedokteran Hewan	-
24	Kenotariatan	-

C. Program Studi Magister Ilmu Lingkungan

Program Studi Magister Ilmu Lingkungan Program Pascasarjana Universitas Udayana berdiri sejak tahun 2001, berdasarkan Ijin dari Depdiknas nomor 1866/D/T/2001. Pembentukan Program Studi Ilmu Lingkungan diprakarsai oleh Pusat Penelitian Lingkungan Hidup Lembaga Penelitian Unud. Pada awal berdirinya hanya memiliki satu konsentrasi, yaitu Lingkungan Pesisir. Pengembangan konsetrasi lingkungan pesisir tidak terlepas dari kondisi lingkungan di Program Studi ini berdiri, yaitu Bali yang merupakan pulau kecil dan dikelilingi laut. Segala sesuatu aktivitas di darat sangat cepat berpengaruh ke pesisir.

Pada tahun 2004, bekerjasama dengan *Center of Remote Sensing and Ocean Science* Unud (CReSOS-Unud), Program Studi Magister Ilmu Lingkungan membuka dua konsentrasi baru, yaitu konsentrasi Biologi Kelautan dan Perikanan, serta *Oceanography and Remote Sensing,* yang kemudian berkembang menjadi *Environmental Remote Sensing*. Pembukaan dua konsentrasi ini berdasarkan Surat Keputusan Rektor Unud Nomor 31/J14/PR.01.10/2004. Melalui kedua konsentrasi baru ini, dikembangkan kerjasama, dan banyak mendatangkan dosen-dosen tamu dari dalam dan luar negeri, seperti Jepang dan Australia. Kerjasama lainnya dilakukan dengan berbagai universitas luar negeri seperti *Sit In* dan *Twinning Program* di beberapa Universitas di jepang pada tahun 2007-2008, yang diikuti oleh sepuluh orang mahasiswa, *research program* selama 12 bulan di Yamaguchi University yang diikuti oleh 3 orang mahasiswa. Pada saat ini menyelenggarakan program *shared lecture* antara Universitas Udayana dengan Y*amaguchi University*-Jepang sejak bulan September 2010.

a. Visi dan Misi

1. Visi Program Studi

Menjadi pusat pendidikan Ilmu Lingkungan yang mampu mengembangkan ilmu pengetahuan dan teknologi secara optimal, sehingga

dapat menghasilkan sumberdaya manusia yang memiliki keunggulan kompetitif dan komparatif di tingkat lokal, nasional, maupun global.

2. Misi Program Studi

Menyelenggarakan pendidikan yang menghasilkan sumberdaya manusia yang memiliki kemampuan akademik/professional yang dapat menerapkan dan mengembangkan ilmu pengetahuan dan teknologi sesuai dengan kebutuhan masyarakat dan perkembangan ilmu pengetahuan dan teknologi.

Upaya mewujudkan misi tersebut didasarkan pada berbagai pertimbangan antara lain: terdiri dari pertimbangan kebutuhan masyarakat dan pertimbangan visibilitas sumber daya manusia yang dimiliki oleh Program Studi Magister Ilmu Lingkungan. Dari berbagai sektor pembangunan yang dilaksanakan pemerintah terlihat bahwa kualitas manajemen merupakan faktor yang sangat menentukan keberhasilan. Berdasarkan penilaian dan pengakuan berbagai pihak, bahwa manajemen merupakan faktor kelemahan yang masih menyolok sebagai penyebab kurang berhasilnya kegiatan di berbagai bidang, termasuk bidang lingkungan.

Banyaknya permasalahan lingkungan yang diungkap berbagai media menunjukkan masih banyaknya permasalahan yang belum dapat dicari pemecahannya. Permasalahan yang timbul berhubungan erat dengan berbagai aspek kehidupan, yang meliputi aspek-aspek: kimia, fisika dan biologi serta aspek kehidupan manusia dengan segenap perilakunya di bidang sosial ekonomi, kebudayaan, keamanan, kesehatan dan pendidikan. Keadaan tersebut menunjukkan bahwa upaya peningkatan manajemen lingkungan masih sangat diperlukan, sesuai dengan misi yang diemban oleh Program Studi ini.

Berkembang dan majunya pembangunan akan memperbesar perubahan lingkungan. Meningkatnya manfaat dapat diperoleh dari sumberdaya alam akan meningkatkan risiko lingkungan sebagai akibat dari perubahan yang terjadi. Oleh karena itu, masyarakat masih sangat memerlukan munculnya tenaga-tenaga ahli lingkungan yang berasal dari berbagai disiplin ilmu, agar dalam penanganan permasalahan lingkungan dapat dilakukan secara terintegrasi

dengan memperbesar manfaat dan memperkecil risiko dari peningkatan pembangunan.

b. Tujuan

Program Studi Magister (S2) Ilmu Lingkungan bertujuan untuk menghasilkan tenaga akademisi dan profesional yang mampu:

1) Berfikir secara analitis, sintetis dan terbuka, serta dapat mengembangkan pengetahuan ilmu lingkungan bagi kesejahteraan masyarakat secara ilmiah;
2) Mengaplikasikan ilmu dan pengetahuan lingkungan dalam rangka mendukung pembangunan nasional yang berkelanjutan (*sustainable development*); dan
3) Mengungkapkan penampilan profesionalnya dalam spektrum yang lebih luas dengan mengkaitkan bidang ilmu atau profesi yang serupa, serta dapat bekerja sama lintas sektoral.

2. 2 *Yamaguchi University*

Yamaguchi University is a national university located in Yamaguchi Prefecture, westernmost tip of Honshu Island, Japan. It has campuses at the cities of Yamaguchi and Ube. Yamaguchi University has its origins in Yamaguchi Kōdō, a private school, founded by Ueda Hōyō, a feudal clansman of Chōshū Province, in the 12th year of Bunka (1815). Since then, this academic institution had undergone many changes in keeping with the needs of the times. In 1949, it was, in the hope for peace and prosperity, reorganized into a new-system of higher education to become a national university, established as the core for the higher education and research in the region. In 2004 it became a national university institutionalized by the National University Corporation, Yamaguchi University. At present, it has approximately 270 full professors and 9,000 student enrollment.

Location and Ambiance

The main campus of Yamaguchi University is, the "Yoshida Campus" located in Yamaguchi City which is the capital city of Yamaguchi Prefecture, with a population of about 130,000. Yamaguchi City has many spots of scenic beauty

and historical value. It flourished as a cultural center of medieval Japan back in the 15th century.

The Faculty of Engineering in the "Tokiwa Campus" and the Faculty of Medicine with its attached hospital in the "Kogushi Campus" is located in Ube City. Ube City has been growing as an industrial city with a population of more than 180,000.

Shin-Yamaguchi Station is the nearest Shinkansen (bullet train in Japan) station, and is about 25 km away from the Tokiwa campus. Yamaguchi-Ube Airport is in the neighborhood of the Tokiwa Campus. It takes about an hour and half to reach Tokyo International Airport, (Haneda).

Ideals and Goals

i. *Creation of a "Place of Wisdom: Discover it, Nourish it, and Realize it"*
ii. *Fostering the Spirit of Cooperation, Interactive Education, and Sharing*
iii. *Respect for Fairness, Equality, and Fraternity*

Goals of Education

i. *Cultivation of Specialties and Adaptability to Society*
ii. *Dedication to Self-Enlightenment, Self-Development, and Self-Management*
iii. *Nurturing Human Resources to Respond the Needs of an Intelligent Society*

Goals of Research

i. *Dissemination and Application of Advanced Research for Social Utilization*
ii. *Establishment of Interdisciplinary Research Systems*
iii. *Conforming to the Visibility and Accountability of Research Activities*

Our Missions

i. *Creation of New Values*
ii. *Contribution to Solving Social Problems*
iii. *Cooperation for the Development of Local and International Societies*

Faculties

At present, the university has seven faculties: Humanities, Education, Economics, Science, Medicine and Health Sciences, Engineering, and Agriculture (Table2).

Tabel 2. *Faculties, Departments and Courses in Yamaguchi University*

Faculties	***Departments***	***Courses***
Faculty of Humanities	*Philosophy, History and Social Science*	*Philosophy, History, Sociology.*
	Language and Literature	*Asian Languages and Literature, Western Languages and Literature.*
Faculty of Education	*Programs in Preschool and School Education*	*Japanese Language and Literature, Social Studies, Mathematics, Science, Music, Art, Physical and Health, Crafts and Technology, Information Science, Home Economics, English, Comparative Studies of Culture, Education for Handicapped Children, Preschool Education, School Education.*
	Programs in Practical School Psychology and Education	
	Programs in Information Science Education	
	Programs in Health Science Education	
	Programs in Culture and Education	
Faculty of Economics	*Economics*	*Economic Theory and Econometrics, Economic Policy, Socio-Economics.*
	Management	*Business Administration, Business Administration Information System, Corporate Accounting, Business and Commerce.*
	International Economics	*International Economic System, International Cooperation, East Asian Economies.*
	Law and Economics	*Economic Fundamental Law, Modern Business Law, Social Life Law, Administrative Law and Politics.*
	Tourism and Travel Industry Policy	*Economic Analysis of Tourism, Communication for*

Faculties	***Departments***	***Courses***
		Tourism.
	Course for Commerce Teachers	
Faculty of Science	*Mathematical Sciences*	*Mathematical Sciences.*
	Physics and Information Sciences	*Physics, Natural Informatics.*
	Biology and Chemistry	*Biological Sciences, Chemistry.*
	Geosphere Sciences	*Earth Sciences.*
Faculty of Medicine and Health Sciences	*Faculty of Medicine*	*Human Science, Neuroscience, Clinical Neuroscience, Stress and Bio-response Medicine, Environmental, Humanity and Health System Science, Radiological and Pathological Science, Reproductive and Developmental Medicine, Epithelial Intelligent and Analytical Medicine Science, Biomedical and Biomolecular Science, Clinical and Biomedical information science, Bio-Signal Analysis, Medical Bioregulation, Molecular Science and Applied Medicine.*
	Faculty of Health Sciences	*Fundamental Nursing, Clinical Nursing, Maternal/Child Nursing, Community/Gerontological Nursing, Basic Laboratory Sciences, Clinical Laboratory Sciences.*
Faculty of Engineering	*Mechanical Engineering*	*Aerospace Course, Bio-Robotics Course.*
	Civil and Environmental Engineering	*Planning and Environmental Engineering, Infrastructure Design Engineering, Fundamentals of Construction Engineering.*
	Applied Chemistry	*Applied Fine Chemistry, Materials Chemistry, Molecular Bio-Related Chemistry.*
	Electrical and Electronic	*Electronic Materials and*

Faculties	***Departments***	***Courses***
	Engineering	*Devices, Communication Engineering, Instrument and Control, Power Engineering.*
	Information Science and Engineering	*Fundamental Information, Information and Intelligence, Applied Information.*
	Architectural and Design Engineering	*Structural Engineering, Environmental Engineering, Architectural and City Planning, Design Engineering.*
	Sustainable Environmental Engineering	*Environmental Materials, Environmental Process, Environmental Systems.*
	Applied Science	*Applied Science*
Faculty of Agriculture	*Biological and Environmental Sciences*	*Agrobiology, Rural Environmental and Information Sciences*
	Biological Chemistry	*Biochemistry, Environmental Biochemistry*
	Veterinary Medicine	*Basic Veterinary Science, Pathogenetic and Preventive Veterinary Science, Clinical Veterinary Medicine.*

Graduate Schools

Yamaguchi University has six graduate schools: the Master Course Programs in Humanities, Education, Economics, Science & Engineering, and Agriculture, and the Doctor Course Programs in Medicine, Science & Engineering, Agriculture & Veterinary Medicine, and East Asian Studies (Table 3).

Tabel 3. *Graduate Schools in Yamaguchi University*

Graduate Schools	***Programs***	***Areas of Concentration/Courses/Course Sections***
Humanities	*Master's Program*	*Regional Culture, Language and Culture*
Education	*Master's Program*	*School Education Studies, Curriculum and Instruction Studies*
Economics	*Master's Program*	*Economics, Business Administration*

Graduate Schools	***Programs***	***Areas of Concentration/Courses/Course Sections***	
Medicine *Medicine*	*Doctoral Program*	*System Control Medicine*	*Human Science, Neuroscience, Clinical Neuroscience, Stress and Bio-response Medicine, Environmental,Humanity and Health System Science.*
		Intelligent and Analytical Medical Sciences	*Radiological and Pathological Science, Reproductive and Developmental Medicine, Epithelial Intelligent and Analytical Medicine Science, Biomedical and Biomolecular Science, Clinical and Biomedical Information Science.*
	Master's Program	*Applied Medical Engineering Science*	*Bio-Signal Analysis, Biomedical Engineering, Medical Bioregulation.*
	Doctoral Program	*Applied Medical Engineering Science*	
	Master's Program	*Applied Molecular Bioscience*	*Functional Molecular Biology, Organic Molecular Chemistry, Molecular Science and Applied Medicine, Biomolecular Engineering, Applied Biological Science.*
	Doctoral Program	*Applied Molecular Bioscience*	
	Master's Program	*Nursing and Laboratory Science*	*Nursing Science, Laboratory Science.*
	Doctoral Program	*Nursing and Laboratory Science*	
Science and Engineering	*Master's Program*	*Mathematical Sciences*	*Mathematical Sciences*
		Physics and Information Sciences	*Physics and Information Sciences*
		Earth Sciences	*Earth Sciences*
		Electronic Materials and Devices Engineering	*Quantum Devices and Materials Engineering, Electric Energy and Power Devices Engineering.*
		Materials Chemistry	*Advanced Materials Science and Engineering, Fine Chemistry.*
		Mechanical Engineering	*Thermal and Fluid Energy Engineering, Mechanical System and Design Engineering.*
		Civil &	*Civil Systems Engineering, Civil*

Graduate Schools	***Programs***	***Areas of Concentration/Courses/Course Sections***	
		Environmental Engineering	*Infrastructure Engineering.*
		Electronic and Information Systems Engineering	*Electronic Systems Engineering, Information Systems Engineering.*
		Perceptual Sciences & Design Engineering	*Architechtural Design & Engineering, Perceptual Sciences & Visual Computing.*
		Environmental Science and Engineering	*Biological Adaptation & Environmental Chemistry, Environmental Management & Sustainable Engineering, Environmental Safety Science & Engineering.*
Science and Engineering	*Doctoral Program*	*Natural Sciences and Mathematics*	*Mathematics and Complex Systems, Physics and Earth System Sciences.*
		Materials Science and Engineering	*Applied Chemistry, Quantum Devices and Materials Engineering, Materials and Energy Science and Engineering.*
		Systems Design and Engineering	*Mechanical Engineering, Civil Engineering.*
		Computer Science and Design Engineering	*Electronic and Information Systems Engineering, Perceptual Sciences and Design Engineering.*
		Environmental Science and Engineering	*Biological Adaptation and Environmental Chemistry, Environmental Management and Sustainable Engineering, Environmental Safety Science and Engineering.*
Agriculture	*Master's Program*	*Bioresources Science*	
East Asian Studies	*Doctoral Program*	*East Asia*	*Comparative Culture, Social Dynamics, Social System Analysis, East Asian Economies.*
Innovation and Technology Management	*Professional Degree Program*	*Technology Management*	*Finance and Corporate Strategy, Industrial Innovation, Intellectual Property Management*
United Graduate School of	*Doctoral Program*	*Veterinary Science*	*Basic Veterinary Science, Pathological and Preventive Veterinary Science, Clinical*

Graduate Schools	***Programs***	***Areas of Concentration/Courses/Course Sections***	
Veterinary Science			*Veterinary Science*
United Graduate School of Agricultural Sciences, Tottori University	*Doctoral Program*	*Bioproduction Science, Bioenvironmental Science, Bioresources Science, Global Arid Land Science.*	

Facilities

The following research and educational centers are dedicated to helping students navigate their way to greater learning and studying.

1. *Library*
2. *Media Information Technology Center*
3. *Collaborative Research Center (CRC)*
4. *Venture Business Incubation Center (YuVIC)*
5. *Innovation Center for Design and Engineering*
6. *University Health Service Center*
7. *Sports and Recreation facilities*
8. *Student Dormitories*
9. *International Student House*
10. *Cafeterias*
11. *University Hall*
12. *Welfare Facility*
13. *Student clubs and societies*

Scholarships

Many international students in Tokiwa Campus receive scholarships from their home government or other funding bodies. The main scholarships for self-supporting international students are outlined below as follows. Scholarships are granted based on the student's academic record and financial situation. Information regarding application procedures is available at the International Student Office.

Japanese Government (Ministry of Education, Culture, Sports, Science and Technology) Scholarship Current& prospective Graduate students/ Research Students:

Application period : September

Prerequisites : Applicants must be less than 35 years old who are currently enrolled in a graduate course or plan to undertake a graduate course.
Amount per month : Master's course: 154,000 yen (2009), Doctoral course: 155,000 yen (2009)
Duration : Until completion of the course

i. Honors Scholarship for Privately Financed International Students

Application period : April
Prerequisites : Graduate level (privately financed graduate students, privately financed research students with an academic history above undergraduate level who research at a graduate level) and Undergraduate level (privately financed undergraduate students).
Amount per month : Graduate students: 65,000 yen (2009), Undergraduate students: 48,000 yen (2009).
Duration : one year

ii. Scholarship, the 50th Anniversary of Establishment of Faculty of Engineering, Yamaguchi University

Application period : April
Prerequisites : Doctoral student course.
Amount per month : 50,000 yen (2009)
Duration : one year

iii. Others

There are other scholarships available in addition to those listed above. Information on these is posted at the information boards of the affiliated faculty or graduate school. Students should refer to http://www.jasso.go.jp/index_e.html for more information on other scholarships. To apply for some scholarships, graduation need certificates and transcripts from home country are required.

Employment Ratio of Graduates

Tabel 4. *Employment Ratio of Graduates in Yamaguchi University*

Fields	***Percentage of Employment (%)***		
	Undergraduate	***Master's***	***Doctoral***
Construction	*3.8*	*10.4*	*1.8*
Manufacturing	*12.7*	*44.5*	*10.5*

Information and Communications, Transport, Post	*8.9*	*7.9*	*5.3*
Wholesale and Retail Trade, Accommodations, Eating and Drinking Places	*11.6*	*2.3*	*0.0*
Finance and Insurance	*9.5*	*0.0*	*1.8*
Medical, Health Care and Welfare	*13.8*	*5.2*	*24.5*
Education, Learning Support	*14.2*	*8.8*	*21.1*
Compound Services, Services, N.E.C.	*10.0*	*10.9*	*17.5*
Government, N.E.C.	*12.9*	*6.8*	*17.5*
Others	*2.6*	*3.2*	*0.0*

Exciting Lifestyle

Students who wish to explore further sites in and around Ube City will enjoy many wonderful and beautiful sceneries and beaches of the Setonaikai National Park, the Akiyoshi plateau (limestone cavern and plateau) National Park, and the Kita-Nagato-Kaigan Quasi National Park.

1. Faculty Of Engineering And Graduate School Of Science And Engineering Profile

The Faculty of Engineering has a history of more than sixty years and has acquired a excellent reputation for an active research and high-quality education. At present, it has seven departments specializing in typical engineering fields and one fundamental department providing education in applied sciences. It also includes the Collaborative Research Center (CRC) and the Venture Business Incubation Center (YuVIC). Along with the goal of developing a wide variety of new fields in engineering, the faculty has evolved by coping with advanced technology.

The Origin of our Faculty of Engineering was the Ube Higher Technical School founded in 1939. In 1949, the technical school was reorganized as the Faculty of Engineering, Yamaguchi University with 4 departments (Mechanical Engineering, Mining, Industrial Chemistry, and Civil Engineering) which later expanded to an organization with 10 departments (47 full professors and an admissions capacity of 420 students). In October 1990, the faculty incorporated the associated technical college and then reorganized into 6 new larger departments specializing in their own area of concentration and one fundamental

department providing an education in applied sciences. In 1996, the faculty opened a brand new department, Perceptual Sciences and Design Engineering, the first of its kind in Japan. With this reorganization, the faculty has an admissions capacity of 590 students and an academic staff that includes 73 full professors.

A. Mechanical Engineering

Mechanical Engineering contributes substantially to all kinds of industrial activities, and therefore has a strong influence on our daily lives. Because of the broad interests of students and wide scope of activities in which the mechanical engineering field is engaged, the research and education activities of the department cover many fields both fundamental and applied, for example: the effective usage of heat-fluid, energy conversion and environmental control, the strength of industrial materials, dynamic analysis of machine, intelligent machine control, synthesis robot and mechatronics system, and machine design and production.

There are currently 24 academic staff members in the department, and every year, the department accepts about 61 new graduate students to the master's courses and 90 freshmen (undergraduates). The department is organized into three principal sections which include the following 12 research and education fields.

i. Thermal and Fluids Energy Engineering
- *Applied Thermal Engineering*
- *Engine System Engineering*
- *Fluid Engineering*
- *Energy Control*

ii. Mechanical Systems and Design Engineering
- *Systems Control*
- *Micro Mechatronics*
- *Instrument and Information Engineering*
- *Strength of Materials*
- *Materials Reliability*

iii. Biomedical Engineering
- *Clinical Biomedical Engineering*
- *Micro Biomedical Engineering*

- *Medical Mechanical Engineering*

B. Civil and Environmental Engineering

It is necessary for people to provide for their needs such as roads, railways, harbours, airports, coastal protection, electrical supplies, transportations, water supplies and dams. At the same time, maintaining the facilities and protecting environments are also regarded as important in our modern way of life.

The Department of Civil and Environmental Engineering provides a curriculum consisting of construction methods and management techniques to satisfy the needs of our safe society. As a result, our students obtain a wider and more long-term view of various aspects to contribute to our peaceful life. Furthermore, we have established the 'East Asia International Course' to educate students to be international civil engineers equipped with professional leadership.

The educational program of the Department of Civil & Environmental Engineering has been recognized to be of international level by the Japan Accreditation Board for Engineering Education (JABEE). With this recognition, our graduates can acquire the qualification of associate engineer (gijutsu shiho) upon application.

The Department of Civil and Environmental Engineering encourages innovative teaching practices to meet the academic and professional needs of its students.

i. Courses

- *Civil Engineering Course*
- *East Asia International Course*

ii. Education Field

- *Geotechnical Safety Engineering*
- *Rock Mechanics Engineering*
- *Soil Mechanics Engineering*
- *Structural Materials Engineering*
- *Urban and Social Systems Engineering*
- *Structural Dynamics Engineering*
- *Disaster Prevention System Engineering*
- *Applied Hydraulics Engineering*

- *Resources Recycling Engineering*
- *Infrastructure Maintenance Engineering*
- *Environmental Geotechnical Engineering*

C. Applied Chemistry

Chemistry supports all aspects of today's daily life by producing materials, medicine, cosmetics, food, etc. so that it is an indispensable field to maintain our society. To satisfy students' wide interests in chemistry, the education in the department covers physical chemistry, organic chemistry, polymer sciences, biochemistry, inorganic chemistry, and chemical engineering. Also, to expand further the chemical knowledge which is applied in many fields closely related to chemistry, three types of graduate schools are provided so they can study material, environmental, and medicinal sciences and to hold wide view points when using their chemical expertise in our society.

Currently 26 academic staffs belong to the department, and every year the department accepts about 90 undergraduate students. The department holds three education sections each of which includes four or five educational divisions.

i. Applied Fine Chemistry
- *Electrochemistry*
- *Polymer Chemistry*
- *Molecular Reaction Chemistry*
- *Catalytic Materials*

ii. Materials Chemistry
- *Inorganic Solid State Chemistry*
- *Crystal Engineering*
- *Organic Molecular Materials*
- *Ceramics*

iii. Molecular Bio-related Chemistry
- *Bioorganic Synthesis*
- *Bioorganic Reaction*
- *Functional Polymer Chemistry*
- *Bioprocess Engineering*
- *Genomic Bioengineering*

D. Electrical and Electronic Engineering

Electrical and Electronic Engineering is an extremely large and diverse field which is associated with both small-scale electronic systems, including

computers and integrated circuits, and large-scale electrical systems, including power transmission and motor control. It is essential that future generations of engineers continue to pursue creative research and new technologies. Therefore, the mission of the department is to produce highly-qualified, well-rounded, and motivated graduates possessing fundamental knowledge of electrical and electronic engineering who can provide leadership and service to Yamaguchi, Japan, and the world.

There are currently 28 faculty members in the department, and every year the department accepts about 80 freshmen to the undergraduate course. The department offers three principal sections that include the following 13 education fields.

i. Electronic Devices Engineering
- *Luminescent Semiconductors and Devices*
- *Compound Semiconductor Device and Process*
- *Energy Conversion Engineering*
- *Nano-Electronics*
- *Magnetic Devices*

ii. Communication Engineering
- *Microwave and Optoelectronic Devices*
- *Communication Systems*

iii. Electronic Instrument and Control
- *Sensing Systems*
- *Control and Systems*
- *Sensors and Systems*

iv. Power Engineering
- *Plasma Science and Technology*
- *Power Electronics*
- *Advanced Energy Engineering*

E. Information Science and Engineering

Our department was established for education on computer systems, intelligent systems and applied systems. Students are required to study various phases of computer and information science, as well as system technology including analysis, planning and management in order to develop highly intellectual and automatic systems.

The department is organized into 14 education fields. Each field pursues its own subjects and makes several common studies with other fields and other universities and colleges. After studying the fundamental courses in all fields, each student majors in one field and acquires knowledge and technology on computer science and systems engineering. The department has currently 25 academic staffs. Every year, 80 undergraduate students are accepted. The department consists of three sections which include the following 14 education fields.

i. Computer Engineering
- *Computer Science*
- *Information and Communication Systems*
- *Software Engineering*
- *Software Reliability Engineering*

ii. Intelligence Engineering
- *Knowledge Engineering*
- *Pattern Recognition*
- *Biological Information Systems Engineering*

iii. Applied Systems Engineering
- *Fundamental Systems*
- *Systems Design*
- *Systems Planning*
- *Disaster Prevention Systems*
- *Advanced Energy Engineering*
- *Vision Science and information Design*
- *Information Media Expression and Methodology*

F. Perceptual Sciences and Design Engineering

The Department of perceptual sciences and design engineering is for the people to study architectural and other design based on sciences of human's perception and sensitivity which is called Kansei in Japanese. At first, students learn the basic engineering which are basic mathematics, science and basic design. Next, students are expected to acquire professional knowledge related to architectural design and the human's Kansei. Furthermore, it is parallel with them, students learn the basic architectural engineering including structure engineering, construction engineering, human environment engineering, architectural planning and city planning. The Department is organized into seven principal education fields.

i. Architectural Design
ii. Kansei Engineering
iii. Structure Engineering
iv. Construction Engineering
v. Human Environment Engineering
vi. Architectural Planning
vii. City Planning

G. Sustainable Environmental Engineering

The Department was founded in 2007 for the purpose of promoting research and education in the area of emerging technology for sustainable environment. The Department is concerned with the research and education on environmentally friendly technologies for sustainable development. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Department provides a unique educational system where students are able to entry an interim program of the graduation thesis in sophomore class. Students are trained on various important aspects of sustainable engineering. These include sustainable materials design, practical environmental analysis, innovation of renewable energy, utilization of natural resources, the protection of the soil and water environment, pollution protection and control techniques for monitoring the natural and built environment, waste processing, recycling and various environmental topics.

There are currently fifteen academic staff members working in the area of material science, chemical engineering and environmental engineering. The Department annually accepts 55 undergraduates and about 50 graduate students to the master's courses of Environmental Science and Engineering and Material Engineering in the Graduate School of Science and Engineering.

i. Environmental Materials
- *Quantum Chemistry*
- *Organic Synthesis*
- *Separation Membranes*

ii. Environmental Process
- *Environmental Biochemical and Chemical Engineering*
- *Environmental and Chemical Engineering*
- *Green Chemical Process*

iii. Environmental System

- *Environmental Management and Sustainable Engineering*
- *Disaster Prevention System*

H. Applied Science

The Department engages in research in applied mathematics and applied physics as fundamentals of engineering, and it is responsible for the education of all students. The Department has no undergraduate students, but does accept graduate students in the research areas of applied mathematics and physics. The research activities cover a very wide field of science and engineering. Main fields of study include: functional analysis; information theory; numerical analysis; theory of partial differential equations; electric, thermal, optical and magnetic properties of condensed matters; surface and interface physics; and theory of solid state physics.

The Department has 12 academic staff members, and includes the following research and education divisions. Applied Science has education fields are Applied Mathematics, Numerical Analysis, Applied Physics, Theoretical Applied Science, Fundamental Materials Physics, Applied Materials Physics, Applied Functional Analysis.

BAB III

KURIKULUM DAN PERKULIAHAN

3.1 Struktur Kurikulum

Kurikulum *Double Degree Program* disusun berdasarkan satuan kredit semester (SKS). Mahasiswa peserta *double degree* harus menyelesaikan minimal 40 SKS mata kuliah utama, dan minimimal 30 SKS di Yamaguchi University. Yang lebih utama, mahasiswa harus menyusun tesis yang dibimbing oleh dosen pembimbing. Beban SKS tersebut diselesaikan dalam jangka waktu 4 semester atau 2 tahun, dengan 1 tahun pertama ditempuh di Universitas Udayana, dan tahun ke dua di *Yamaguchi University*-Jepang.

Kurikulum telah disusun dan disesuaikan di masing-masing Universitas. Sebanyak 10 mata kuliah dijalankan dalam program *shared lecture*, yang pengajarnya berasal dai Universitas Udayana dan *Yamaguchi University*, dengan metoda perkuliahan menggunakan media *teleconference*. Kurikulum selengkapnya disajikan pada Tabel 5.

Tabel 5. Kurikulum Konsentrasi *Environmental Remote Sensing* Program Studi Magister Ilmu Lingkungan Program Pascasarjana Unud

No	Koda mata kuliah	Nama mata kuliah	SKS	Keterangan
Semester I				
1	ULM101	*English *)*	*Non Unit*	*Prerequisite*
2	ULK101	*Computer **)*	*Non Unit*	*Prerequisite*
3	ULP111	*Science Phylosophy*	1	*Compulsory*
4	ULI121	*Environmental research methodology and statistic*	2	*Compulsory*
5	LPI2208	*Disaster Mitigation*	2	*Compulsory*
6	LMI1202	*Environmantal Fluid Dynamics*	2	*Compulsory*
7	LRI1201	*Space Enginering & Satellite Remote Sensing*	2	*Compulsory*
8	LRK2201	*Advanced Geoinfomatics*	2	*Compulsory*
Total			11	
Semester II				
1	LPI1201	*Ecology and environment*	2	*Compulsory*
2	LPI2208	*Environmental Pollution*	2	*Compulsory*
3	LRI3207	*Lake and Coastal*	2	*Elective*

No	Koda mata kuliah	Nama mata kuliah	SKS	Keterangan
		Environmental		
4	LRI1202	*Climate Change*	2	*Elective*
5	LRK2211	*Oceanography*	2	*Compulsory*
6	LPM2101	*Field study*	1	*Compulsory*
7	LPK2101	*Colloqium*	1	*Compulsory*
Total			12	
Semester III				
1	-	*Elective Courses*	2	*Elective*
2	-	*Elective Courses*	2	*Elective*
3	LPK3202	*Research Proposal*	2	*Compulsory*
Total			6	
Semester IV				
1	LPK4203	*Research result seminar*	2	*Compulsory*
2	LPK41204	*Tesis*	12	*Compulsory*
Total			14	

NB. Beberapa matakuliah berjalan dengan *Program Shared Lecture*

Tabel 6. Mata kuliah pilihan konsentrasi

No	Koda mata kuliah	Nama mata kuliah	SKS	Keterangan
s1	LRK3204	*Marine Telemetry*	2	*Elective*
2	LRK3205	*Marine Geographic Information System*	2	*Elective*
3	LRI3203	*Thermal and Microwave Remote Sensing*	2	*Elective*
4	LRI3204	*Marine Acoustic*	2	*Elective*
5	LRK3206	*Sensor System in Marine Instrumentation*	2	*Elective*
6	LRK3207	*Acoustic Oceanography*	2	*Elective*
7	LMI3208	*Air-Sea Interaction*	2	*Elective*
8	LMI3209	*Coastal and Estuarine Dynamics*	2	*Elective*
9	LMI2205	*Fisheries Oceanography*	2	*Elective*
10	LPK3208	*Monitoring of Natural Disaster*	2	*Elective*
11	LPK3209	*Ocean Imaging by SAR & Optical Sensor*	2	*Elective*
12	LRI3205	*Ocean Circulation and Modeling*	2	*Elective*
12	LMK3202	*Image Processing & GIS*	2	*Elective*
13	LRK3208	*Data Processing Theory*	2	*Elective*
14	LRK3209	*Marine Acoustic*	2	*Elective*
15	LRK3210	*Marine Instruments*	2	*Elective*
17	LRI3206	*Ocean Remote Sensing*	2	*Elective*
	LRK3211	*Land, Water and Vegetation Conservation*		*Elective*
	LRK3212	*Digital Image Processing*		*Elective*
	LRK3213	*Environmental Remote Sensing*		*Elective*

3.2 Deskripsi Mata Kuliah

A. Mata kuliah inti

Diskripsi mata kuliah inti dapat dijelaskan sebagai berikut:

Subject **: Filsafat Ilmu*/ Science Philosophies***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *1 unit***
Semester **: *1***
Lecturer **: Prof. Dr. dr. I Made Bakta, SP.Pd (K)**
Prof. Dr. Ir. I Wayan Suarna, MS
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Pengertian dasar filsafat, masalah kefilsafatan, cara berpikir kefilsafatan, lingkup bidang kajian filsafat (metafisika, epistemologi, aksiologi), manfaat mempelajari filsafat 2. Pengertian dasar filsafat ilmu: batasan, lingkup bidang kajian filsafat ilmu, fungsinya dalam pengembangan arah kelimuan 3. Pengetahuan: batasan, jenis-jenis pengetahuan, cara mendapatkan pengetahuan 4. Ilmu: batasan ilmu, kajian ilmu dari segi ontologi, epistemologi, dan aksiologi. Pengertian ilmu dari aktivitas berpikir, metode berpikir dan produk beripikir. 5. Metode ilmiah: dasar pemikiran (rasionalisme,	*45 minutes x 15*	1. Gie TH. Pengantar Filsafat Ilmu. Cetakan Kedua. Yogyakarta: Penerbit Liberty, 2000. 2. Kuhn TS. The Structure of Scientific Revolution. Chicago: Chicago University Press, 1972. 3. Mustansyir R, Munir M. Filsafat Ilmu. Yogyakarta: Pustaka Pelajar, 2001. 4. Suariasumantri JS. Filsfat Ilmu, sebuah pengantar. Jakarta: Sinar Harapan, 1984 5. Thoyibi M. Filsafat Ilmu dan Perkembangannya. Surakarta: Muhammadyah University Press, 1999 6. Tim Dosen Filsafat Ilmu Fakultas Filsafat UGM. Filsafat Ilmu Sebagai Dasar Pengembangan Ilmu Pengetahuan. Yogyakarta: Penerbit Liberty, 2001.	*1 times report* *1 time examination*

empirisisme, kritisime, positivisme), tata langkah, dan alat untuk mendapatkan pengetahuan ilmiah 6. Kebenaran ilmiah: teori kebenaran ilmiah 7. Alat berpikir ilmiah: logika, bahasa, matematika, dan statistika 8. Aksiologi: pengertian tentang nilai (values), moral, etika dan estetika. 9. Struktur ilmu, tujuan dan pengembangan ilmu 10. Diskusi mengenai topik-topik yang relevan dengan pengembangan Ilmu Lingkungan.			

Subject **: Ekologi dan Ilmu Lingkungan*/Ecological and Environment***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof. Dr. Ir. IPG Ardhana, M.Agr.Sc**
Ir. A.A. Gde Raka Dalem, M.Sc

(Hons)
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Tatasurya 2. Ekologi sebagai dasar ilmu lingkungan 3. Sumberdaya Alam 4. Masalah kependudukan dalam	*90 minutes x 15*	1. Botkin, D. Dan Edward, K. 1995. Enviromental Science Earth As a Living Planet John Wiley & Song Ince, New York. 2. Darsono, V. 1992. Pengantar Ilmu Lingkungan Penerbit Atma Jaya, Yogyakarta. 3. Iskandar, N. 1978. Teori-teori	*1 times report and 2 time examination*

pembangunan 5. pencemaran dan pengaruhnya terhadap lingkungan 6. Teknologi sebaga unsur kebudayaan dan pengaruhnya terhadap lingkungan *7.* Etika lingkungan dalam pembagnunan		Kependudukan, LD-FE-UI, Jakarta. 4. Koentjaraningrat, 1984. Kebudayaan Mentalitas dan Pembangunan, Penerbit PT. Gramedia, Jakarta. 5. Krishnan Kannan. 1997. Fundamental of Pollution of the Environment. Simon &Schuster Macmillan, New York. 6. Miller, GT. 1979. Living in the Environment Second Edition. Wadsworth Publishing Company, Belmont California. 7. Odum, E.P. 1994. Dasar-dasar Ekologi. Gajah Mada University Press. 8. Soemaroto, O. 1994. Ekologi, Lingkungan Hidup dan Pembangunan. Penerbit Djambatan. 9. Soeparmo, HA. 1998. Wawasan Lingkungan Hidup Airlangga University Press. 10. Soerjani, M. Rofiz, A. Rozy, M. 1987. Lingkungan Sumberdaya Alam dan Kependudukan Dalam Pembangunan. Penerbit Universitas Indonesia. *11.* Sonny Keraf, A 2002. Etika Lingkungan. Penerbit Buku Kompas, Jakarta.	

Subject **: Metodologi Penelitian Lingkungan dan Statistik*/Research Methodology and Statistical***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof. Dr. Ir. I Gede Mahardika, MS**
Prof. Dr. Ir. I Wayan Suarna, MS
Drh. Ida Bagus Windia Adnyana, Ph.D
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Pengertian statistik	*90 minutes*	1. Everitt, B. S., and G. Dunn.	*1 times*

untuk lingkungan; 2. Dasar penyajian data kualitatif dan kuantitatif serta analisis statistik ; 3. Distribusi frekuensi, mean, median, modus dan penghitungan nilai tedensi sentral; 4. Standard deviasi; kurtosis; dasar teori probabilitas, distribusi normal; 5. Regresi; korelasi, metode penelitian, parameter penelitian; 6. Sampling dan analisis penelitian; 7. Penyusunan rencana penelitian; *8.* Llatihan penelitian lingkungan dan penulisan laporan	*x 15*	1991. Applied multivariate data analysis. Halsted Press in imprint of John Wiley and Sons Inc. New York. 2. Ludwig, J. A., and J. F. Reynold. 1988. Statistical ecology: A primer on method and computing. John Wiley and Sons Inc. New York; 3. Neter, J., W. Wasserman., dan M. H. Kutner. 1990. Applied linear statistical models. Third edition. Richard D Irwin ,Inc. Toppan Company, Ltd. Tokyo.; 4. Spiegel ; M.R. 1981 Statistic Schaum's Outline Series; Singapore, Mc Graw-Hill, International Books Company; *5.* Sudjana, 1992. Metoda Statistika. Bandung, Penerbit Tarsito	*report and 2 time examination*

Subject **: Pencemaran Lingkungan*/Environmental Pollution***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof. Ir. M. Sudiana Mahendra, MApp Sc, Ph.D.**
Prof. Dr. I Wayan Budiarsa Suyasa, MS
Drh. I Ketut Suada, M.Si
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Arti dari pencemaran air 2. sumber-sumber bahan pencemaran air 3. Jenis-jenis bahan pencemaran air 4. Penaruh bahan pencemar	*90 minutes x 15*	1. Alaerts, G. dan Santika, SS. 1984. Metode Penelitian Air. Usaha Nasional Surabaya Indonesia. 2. Azrul, A. 1996. pengantaar Ilmu Sanitasi Lingkungan. Mutiara sumber Widia. 3. Connell, DW. Dan Miller, GJ. 1995. Kimia dan	*1 times report and Examination*

5. Teknik sampling dan perlakuan sampel 6. Teknik analisis sampel 7. Model pengelolaan buangan.		Ekotoksikologi Pencemaran (Terjemahan). Universitas Indonesia. 4. Jenie, BSL. Dan Fardiaz, S.1989. Uji Sanitasi dalam industri Pangan. IPB Bogor *5.* Haslam, SM. 1992 River Polution: An Ecological	

Subject **: Praktek Kerja Lapangan*/ Field Study***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *1 unit***
Semester **: *2***
Lecturer **: Prof. Ir. M. Sudiana Mahendra, MApp Sc, Ph.D.**
Prof. Dr. I Wayan Budiarsa Suyasa, MS
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Bagaimana berfikir kritis 2. Membangkitkan berbagai pertanyaan 3. Diskusi terbatas 4. Diskusi kelompok 5. Diskusi umum 6. Menulis suatu rencana penelitian dan program kerja	*90 minutes x 15*		*1 times report*

Subject **: Kolokium*/Colloquium***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *1 unit***
Semester **: *1***
Lecturer **: Prof. Ir. M. Sudiana Mahendra, MApp Sc, Ph.D.**
Prof. Dr. I Wayan Budiarsa Suyasa, MS
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Teknik berseminar 2. Cara membuat transparan 3. Bertanya dan menanggapi pertanyaan 4. Praktek sebagai presenter bagi tiap mahasiswa 5. Praktek sebagai penyanggah bagi tiap mahasiswa	*90 minutes x 15*		*1 times report*

6. Mengulas hasil suatu presentasi			

Subject **: *Space Engineering and Satellite Remote Sensing***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: *Prof. Tasuku Tanaka***
Ass.Prof. Takahiro Osawa
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Introduction to Satellite Remote Sensing *2. Processing Satellite Remote Sensing Data* *3. Training of Downloading of MODIS, AMSRE Data* *4. Training of Reading HDF file* *5. Training of Application Software "ENVI"* *6. Space and Earth* *7. Satellite Orbit Dynamics* *8. Satellite System* *9. Electromagnetic Wave and Photon* *10. Visible and Near-Infrared Remote Sensing* *11. Thermal-Infrared Remote Sensing* *12. Passive Micro-Wave Remote Sensing* *13. Radar and Lidar Remote Sensing* *14. Retrieval of Geo-Physical Parameter* *15. Ocean Remote Sensing*	*90 minutes x 15*	*1. Improving Our Understanding of Climate Change by GLI http://suzaku.eorc.jaxa.jp/GLI/doc/GLI_BOOK_CD/START.HTM* *2. Improving Our Understanding of Climate Change by AMSR-E http://sharaku.eorc.jaxa.jp/AMSR/doc/index.html* *3. Remote Sensing Hand book edited by JARS* *4. NASA Remote Sensing Tutorial (http://rst.gsfc.nasa.gov/)* *5. CCRS Remote Sensing Tutorial* *6. Introduction to the Physics and Techniques of Remote Sensing* *7. Charles Elachi,* *8. Physical Fundamentals of Remote Sensing* *9. Erwin Schanda, Springer* *10. Introduction To Physical Oceanography* *11. Robert H. Stewart,*	*1 times report*

Subject **: *Digital Image Processing***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1 and 2***
Lecturer **: Prof. Toshihide Miike**
Ass.Prof. Takahiro Osawa
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. *What is digital image processing* 2. *Light and the electromagnetic spectrum, image sensing and acquisition* 3. *Image sampling and quantization* 4. *Intensity and Transformation* 5. *Fundamentals of spatial filtering* 6. *Practice (1)* • *Installing the programming environment of Processing.* • *How to use the Processing.* • *Fundamentals of image processing.* 7. *Practice (2)* • *Quantization and image matrix.* • *Image negatives* • *Intensity resolution* 8. *Practice (3)* • *Geometric spatial transformations* • *Image registration* 9. *Practice (4)* • *Histogram* • *Contrast change*	*90 minutes x 15*	1. *B. Jahne, "Digital Image Processing; Concepts, Algorithms, and Scientific Applications, 3rd ", Springer, 1995* 2. *H. Shimoda et al., "Image Processing" (in Japanese), CG- ARTS association (2001)* 3. *R.C. Gonzalez and R. E. Woods, "Digital Image Processing", Third Edition, Pearson education international, 2002*	*3 times report*

• *Automatic gain control* • *Histogram equalization* *10. Practice (5)* • *Fundamentals of spatial filtering* • *Smoothing spatial filter* • *Median filter* • *Sharpening spatial filters* – *The Laplacian* *11. Practice (6)* • *2-Dimensional Fourier Transform* • *Frequency Domain* • *Filtering in the Frequency domain* *12. Final Lecture* • *2-Dimensional Fourier Transform* *1)Complex Spectrum Image* *2)Power (Intensity) Spectrum Image* • *Filtering in the Frequency Domain* • *Filtering in the Space Domain* *1)Linear Spatial Filter* *2)Non-Linear Spatial Filter*			

Subject **: *Disaster Mitigation***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof. Fusanori Miura**
Prof. Fumihiko Nishio
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Overview of Natural Disasters In the World *2. Overview of Application of Satellite Remote Sensing to Natural Disasters* *3. Earthquake Disasters* *4. Tsunami Disasters* *5. Concentrated Heavy Rain Disasters* *6. General global change, geo-hazard, disaster (include climate change, cryosphere, etc)* *7. Basic remote sensing* *8. Remote sensing application* *9. Oceanography, Atmosphere, Biosphere, Climate Change, Cryosphere* *10. Flood, Landslide, Oil Spill, Land use, Volcano, Earthquake* *11. Weather and Environmental Issues* *12. Typhoon, Cyclone and Hurricane Disasters* *13. Volcano Disasters* *14. Disaster Prevention Information Systems and Remote Sensing* *15. International Cooperation and Possibility of Future*	*90 minutes x 15*	*1. http://www.iej-tars.org* *2. http://www.eorc.jaxa.jp/ALOS/img_up/jdis_opt_idneq_oct2010_1.htm* *3. http://www.eorc.jaxa.jp/ALOS/img_up/jdis_pal_merapi_oct2010_1.htm* *4. JERS-1/SAR(1998.9.10~16)* *5. http://www.eorc.jaxa.jp/ALOS/img_up/jdis_pal_merapi_oct2010_2.htm* *6. http://www.eorc.jaxa.jp/ALOS/img_up/jdis_pal_merapi_oct2010_2.htm*	*5 times report*

Satellite Remote Sensing			

Subject **: *Advanced Geoinfomatics***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof. Masahiko Sekine**
Prof. Norikazu Shimizu
Ass.Prof.Koichi Yamamoto
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Introduction of Geoinformatics and Positioning System *2. Global Positioning System at a Glance* *3. Global Coordinate System* *4. Methods for Positioning* • *Point Positioning* • *RelativePositioning* *5. Application of GPS for Monitoring Displacements* *6. Why is indonesia burning?* *7. Mega Rice Project and its Effect on The Groundwater Drainage and Peat Fire* *8. Fire Detection From The Space* *9. Planing the GPs surveys in Indonesia* *10. Training of editing bathymetry*	*90 minutes x 15*	*1. Pratap Misra and Per Enge: Global Positioning System: Signals, Measurements, and Performance, Second Edition, Ganga-Jamuna Press, US, 2006.569p.* *2. Satellite Navigation and Positioning Lab, the University of New South Wales (UNSW): Notes on Basic GPS Positioning and Geodetic Concepts, UNSW, Australia, 1999. 86p.* *4. GPS and related subjects, Wikkipedia.* *5. Geospatial Information Authority of Japan (GSI):* *3. http://www.gsi.go.jp/ENGLISH/index.html* *6. Japanese books related to GPS and Geoinformatics.* *4. Sentinel ASIA (JAXA) https://sentinel.tksc.jaxa.jp/sentinel2/webGISControl.action?subsetName=Wildfire+Monitorng* *5. MODIS Fire Detection System (AIT) http://www.geoinfo.ait.ac.th/mod14/index.php* *6. FIRMS/NASA MODIS Rapid Response System http://maps.geog.umd.edu/firms/resources.*	*2 times report*

Subject **: *Environmental Fluid Dynamics***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1 and 2***
Lecturer **: Ass.Prof.Koji Asai**
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Introduction Of Environmental Fluid Dynamics *1.1 Introduction* *1.2 Fundamental properties of fluids* *2. Basic Equtions Of Fluid Dynamics* *2.1 Flux* *2.2 Lagrange derivative* *2.3 Conservation of mass* *2.4 Conservation of momentum* *2.5 Stress tensor* *2.6 Navier-Storks equation* *2.7 Static pressure* *3. Turblent Flow* *3.1 Laminar flow and Turbulent flow* *3.2 Reynolds equation and Reynolds stress* *3.3 Mixing length model and the log low* *3.4 Turbulent energy equation and Turbulent energy dissipation equation* *3.5 Closure model (the k-e model)*	*90 minutes x 15*	*1. Lecture Note for* *2. Environmental fluid* *3. Dynamics* *4. (for learning Methodology and* *5. Oceanography)* *6. Division of Civil and Environmental Engineering* *7. Graduate School Science and Engineering* *8. Yamaguchi University* *9. Koji Asai*	*2 times report*

4. Diffusion *4.1 Advection-diffusion equation* *4.2 Example of analytical solution* *5. Buoyancy Effect* *5.1 Buoyancy* *5.2 Boussinesq approximation* *5.3 Buoyancy frequency* *6. Geostrophic Flow* *6.1 Momentum equation relative to a rotating frame* *7. 6.2 Geostrophic flow*			

Subject **: *Oceanography***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1***
Lecturer **: Prof.Masahisa Kubota**
Dr.Yuji Kashino

Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. .Introduction of Oceanography *2. Introduction of Physical Oceanography* *3. Tsunami.* *4. Surface Heat Flux* *5. Ocean Remote Sensing* *6. Ocean Current and Eddy* *7. Equation of Motion* *8. Geostropic Current* *9. Ocean circulation* *10. Tropical Ocean* *11. Oceanography in and around Indonesia* *12. Ocean Wave* *13. Ocean tide* *14. Ocean Observation*	*90 minutes x 15*	*1. Introduction of Dynamical Oceanography (By Pond and Pickard, 1983)* *2. Ocean Circulation (By Open University, 1989)* *3. Tomczak and Godfrey, 2001* *4. Broecker, 1991* *5. Pond and Pickard, 1983* *6. Isozaki and Suzuki, 1998* *7. Unoki and Kubota, 1996* *8. Ray et al., 2005*	*1 times report* *1 time examination*

15. Examination			

Subject **: *Climate change***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *1 and 2***
Lecturer **: Prof. Akimasa Sumi**
Prof.Dr.Ir. I Wayan Kasa, M.Rur.Sc
Prof. Manabu Yamanaka

Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Climate Change Basic Theory *2. Basic Theory -2* *3. Climate Change and Natural Variability* *4. Climate Models* *5. IPCC and Global Warming Simulation* *6. Global Warming/Climate Change* *7. Consequences of Recent Warming* *8. Facts About Climate Change* *9. Climate change governance: An international liberal-democratic system International political activity Cutting greenhouse gas emissions* *10. A. Climate Change Is Not a Serious Problem* *B. Climate Change is Man-Made* *11. Introduction: Origin of Earth's atmosphere and ocean* *12. Conservation laws and basic equations* *13. Long coastline of*	*90 minutes x 15*	*1. Stull (1988) - An Introduction to Boundary Layer Meteorology* *2. Andrews (2000) - An Introduction to Atmospheric Physics (1st ed)* *3. Johnson & Houze (Eds) (2003) - A Half Century of Progress in Meteorology* *4. Turner (1973) - Buoyancy Effects in Fluids* *5. Or can go in this link URL: http://aoe.scitec.kobe-u.ac.jp/~mdy/library/ to learn related books about climate change*	*3 times Report*

Indonesian maritime continent controlling global climate *14. Radiative-convective equilibrium and atmospheric vertical structure* *15. Wave and Convection*			

Subject **: *Land, Water and Vegetation Conservation***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *2***
Lecturer **: Prof. Dr. Ir. I Nyoman Merit, M,Agr.**
Prof. Ir. M.Sudiana Mahendra, MAppSc, PhD.
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Introduction *2. Principal Concept and Hydrology* *3. Factor Influencing Erossion (1)* *4. Factor Influencing Erossion (2)* *5. Soil and Water Conservation Method (1)* *6. Soil and Water Conservation Method (2)* *7. Crop and Vegetation Management (1)* *8. Crop and Vegetation Management (2)* *9. Agroforestry for Soil Conservation (1)* *10. Agroforestry for Soil Conservation* *11. Environmental Impach Assesment* *12. Environmental Impach Assesment*	*90 minutes x 15*	*1. Typical infiltration rates for various soils (Morgan, 2005)* *2. Erossion Prediction (Wischmeier and Smith ,1978)* *3. Principles For Soil And Water Conservation (FAO, 1995)* *4. Five Group of Soil Conditioner (De Boodt,1973)* *5. Soil Management for Conservation of Land, Water, and Vegetation (by Shaxson and Barber, 2003)* *6. Land capability classification criteria (Arsyad, 1989)*	

13. Environmental Impach Assesment 14. Environmental Impach Assesment 15. Environmental Impach Assesment		7. Guidelines For Determining Tolerable Soil Loss (Thompson, 1957)	

Subject **: *Lake and Coastal Environment***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *2***
Lecturer **: Ir.I Wayan Arthana,MS, Ph.D**
Ass.Prof.Koichi Yamamoto
Ir. Ida Ayu Astarini, M.Sc., Ph.D
Standard Competency **:**

Lecture Material	Time Allocation (minutes)	Reference	Evaluation
1. General introduction of lake and coastal 2. Physical properties of lake and estuarine water 3. Water quality in the lake and estuary 4. Biological components and habitat type at lake and coastal 5. Types of habitat at lake and coastal 6. Seaweeds and seagrass ecosystem 7. Estuary ecosystem 8. Adaptation of Estuary Biota 9. Hard and soft coral ecosystem 10. Association of coral biota 11. Mangrove types 12. Mangrove Distribution and Zonation 13. Characteristic of society at lake and coastal area 14. Environmental condition at small	90 minutes x 15	1. Fourth Edition of Marine Biology by Peter Castro and Michael E.Huber 2. Limnology, 2nd edition, Willey (J. Horne and Goldman ,1995) 3. Marine FreshWater Research Volume 49 (CSIRO, 1998) 4. Ecological and economic valuation of the Potengi estuary 5. mangrove wetlands (NE, Brazil) using ancillary spatial data (Sauza et.al, 2010)	3 times report

islands *15. Threatened at lake and coastal*			

Subject **: *Environment Remote Sensing***
Study Program **: *Environmental Science***
Major **: *Environmental Remote Sensing***
Unit **: *2 unit***
Semester **: *2***
Lecturer **: Prof. Saichi Saitoh**
Dr. Masanobe Shimada
Ms.Misako Kachi
Mr. Kenji Imaoka
Standard Competency **:**

Lecture Material	*Time Allocation (minutes)*	*Reference*	*Evaluation*
1. Important issues in sustainable fisheries and aquaculture *2. Principle of satellite remote sensing and marine-GIS* *3. Concepts of multi-sensor remote sensing strategy* *4. Marine-GIS (Geographical Information System) and IT* *5. Practical use of satellite remote sensing and Marine-GIS to fisheries* *6. Practical use of satellite remote sensing and Marine-GIS to aquaculture* *7. Introduction :Syntetic Arperture Radar (SAR) and Optical (OPS) image* *8. SAR System* *9. SAR Imaging* *10. Callibration* *11. Ortho-rectification/Slope Correction* *12. Interferometry* *13. Pollarimetry* *14. Application*	*90 minutes x 15*	*1. Kiyofuji, K. and S. Saitoh: Detection of Possible Japanese Common Squid (Todarodes pacificus) Migration Routes in the Sea of Japan from Nighttime Visible Images, Marine Ecology Progress Series, 276:173-186 (2004).* *2. Zainuddin, M., K. Saitoh, and S.-I. Saitoh: Detection of potential fishing ground for albacore tuna using synoptic measurements of ocean color and thermal remote sensing inthe northwestern North Pacific, Geophysical Research Letter,Vol.31, L20311, doi:10.1029/2004GL021000 , (2004).* *3. Zainuddin, M., H. Kiyofuji, K. Saitoh and S.-I. Saitoh: Using multi-sensor satellite remote sensing and catch data to detectocean hot spots for albacore (Thunnus alalunga) in the northwestern North Pacific, Deep-sea Research, Part II, 53, 419-431 (2006).* *4. Zainuddin, M. K. Saitoh and S.-I. Saitoh: Albacore*	*3 times report*

15. Passive Microwave Remote Sensing-Part 1 *16. . Precipitation Measurement Part 1* *17. Precipitation Measurement Part 2* *18. Passive Microwave Remote Sensing Part 2* *19. Satellite Data set and Product by JAXA*		*(Thunnus alalunga) fishing ground in relation to oceanographic conditions in the western North Pacific Ocean using remotely sensed satellite data, Fisheries ceanography, 17(2), 61-73, doi:10.1111/j.1365-419.2008.00461.x (2008)* *5. Microwave spectrum of water vapor,oxygen,and cloud liquid water (Provided by Dr.Shibata,JAXAEORC).* *6. Pressure dependency of attenuation around water vapor line (provided by Dr. Shibata, JAXA EORC)* *7. Sentinel Asia:* *8. http://dmss.tksc.jaxa.jp/sentinel/* *9. JAXA/EORC Tropical Cyclone Database:* *10. http://sharaku.eorc.jaxa.jp/TYP_DB/index_e.shtml* *11. TRMM near real time image:* *12. http://sharaku.eorc.jaxa.jp/trmm/RT/index_e.html* *13. Global Rainfall Map in near real time:* *14. http://sharaku.eorc.jaxa.jp/GSMaP/* *15. TRMM website:* *16. http://www.eorc.jaxa.jp/TRMM/* *17. AMSR-E Web site:http://sharaku.eorc.jaxa.jp/AMSR/*	

B. Mata kuliah Penunjang Tugas Akhir

Selain mata kuliah tersebut di atas, mahasiswa juga menempuh mata kuliah guna menunjang penelitian yang akan dilakukan. Mata kuliah tersebut diselenggarakan di Yamaguchi University, antara lain sebagai berikut:

University **: *Yamaguchi University***

Faculty/Graduate School **: *Engineering/Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Theory of Compressible Fluid Mechanics***
Credit/unit **: *2***
Academic Staff/Lecturer **: Prof. Shinsuke Mochizuki**
Semester **: *I***

An outline of the course:

Learn the fundamentals of compressible fluid dynamics in one-dimensional flow, nozzle and diffuser flow analysis, which describes how to calculate the static power of the compressor must work with, and also do the commentary for the propagation of sound waves based on wave equation.

General aim of teaching:

- *The one-dimensional isentropic compressible flow, the speed can be calculated pressure and temperature characteristics.*
- *Static for a job based on the assumption of isothermal compressor isentropic or, to make sense.*

Goals of Teaching:

- *Understanding the perspective of knowledge: calculated on the basis of appropriate assumptions for compressible flow calculations can be understood.*
- *Thinking in terms of decision: to understand how to relate to actual and isentropic and isothermal assumptions, such as.*
- *Motivation in terms of interest: the answer to the problem, consideration may be added.*
- *In terms of attitude: to attend the lecture.*

Lesson plan content:

- *Part 1: general description of compressible flow: an overview of instruction outside the classroom from the comparison of compressible fluid dynamics and incompressible flow: Submission deadline to solve the problem.*
- *Part 2: What conservation law: outside of the classroom instruction leading to the mass and energy conservation for compressible flow.*
- *Part 3: What one-dimensional isentropic flow: outside of the classroom instruction explain the one-dimensional isentropic flow.*
- *Part 4: What formula Rankin: Rankin expression, the instructions describe the critical conditions outside the classroom.*
- *Part 5: What the nozzle and diffuser flow: speed, outside of class instruction describes a change in pressure and temperature.*
- *Part 6: What effects of friction: the effect of friction explanation outside of the classroom instruction in compressible flow:*
- *Part 7: Content Shock: outside of the classroom instruction before and after the shock wave leads to the characteristic equation of the shock.*
- *Part 8: Job Description of fluid machinery: the instructions described in the general work outside of class to calculate the power required.*
- *Part 9: Content Head of incompressible flow theory: a review outside of*

class instruction and related expressions for Euler theory heads.

- *Part 10: The content in static compressible flow work: describe the work outside of class instruction in critical static compressible flow.*
- *Part 11: The content of the work method for calculating static: outside of the classroom instruction explain how to compute with appropriate assumptions.*
- *Part 12: The content and sonic wave equation: outside of the classroom instruction based on assumptions derived from the wave equation of motion.*
- *Part 13: What properties of sound and Classification: Classification is performed outside of the classroom instruction of the hydrodynamic characteristics and acoustic instruments.*
- *Part 14: The content source and flow: description outside of the classroom instruction and related matters associated with the current generation of sound.*
- *Part 15: The content Turbulent Noise Analysis Basics: According to the Light hill equation, describes the relationship between the outside of the classroom instruction and sound turbulence.*
- *Part 16: Final exam*

Evaluation Method (General):

Based on the comprehensive evaluation and test reports submitted to the challenge

Textbook:

Ikuo Nakamura, Hideo Osaka/"Hardening Fluid Dynamics": Kyoritsu Shuppan, 1985

Message:

I use the laws of thermodynamics, in a discussion about energy, please refer to the products and learn enthalpy and entropy.

Contacts:

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Phone: 0836-85-9117

University **: *Yamaguchi University***

Faculty/Graduate School **: *Engineering/Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Mathematical Theory of Fluid Science***
Credit/unit **: 2**
Academic Staff/Lecturer **: Prof. Takahiro Nishiyama**
Semester **: I**

An outline of the course:

Examined using complex function theory for vortex motion without a two-dimensional inviscid incompressible fluid. Assumes a basic knowledge of fluid mechanics.

General aim of teaching:

To understand the complex potential of a simple flow. Using conformal mapping, to understand the complex flow potential for a slightly more complicated.

Goals of Teaching:

Knowledge in terms of understanding: to understand the complex potential of a simple flow. Using conformal mapping, to understand the complex flow potential for a slightly more complicated.

Lesson plan content:

- *Part 1: Analysis/Introduction vector (1)*
- *Part 2: Vector Analysis (1)*
- *Part 3: Vector Analysis (2)*
- *Part 4: Complex function theory (1)*
- *Part 5: Complex function theory (2)*
- *Part 6: Complex function theory (3)*
- *Part 7: Complex function theory (4)*
- *Part 8: Complex potential (1)*
- *Part 9: Complex potential (2)*
- *Part 10: Complex potential (3)*
- *Part 11: Complex potential (4)*
- *Part 12: Conformal mapping (1)*
- *Part 13: Conformal mapping (2)*
- *Part 14: Conformal mapping (3)*
- *Part 15: Summary*

Evaluation Method (General):

Evaluated by the results of the quiz multiple times

Textbook: -

Message:-

Contacts:

Laboratory: Second Floor North Main Building
Office hours

University **: *Yamaguchi University***

Faculty/Graduate School **: *Engineering/ Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: Control Design Theory**
Credit| unit **: 2**
Academic Staff/Lecturer **: *Assoc. Prof. Fumitake Fujii***
Semester **: I**

An outline of the course:

Undergraduate courses in control theory (basic control engineering, control engineering systems) received a recruitment plan to deepen knowledge and understanding will be able to operate in practice to understand the control theory. In addition, CAD (MATLAB or octave) control system by using a control system designed in accordance with the actual control system design methods are covered in the lectures, exercises and challenges of how to do a

simulation to evaluate the performance of the control to learn through the study.

General aim of teaching:

Increase their knowledge of control system design, the ability to understand the implications of control theory, which aims to acquire the ability to apply theory to control system design for the actual system.

Goals of Teaching:

- *Understanding the perspective of knowledge: research paper on the level of control (both theoretical and applied) that will allow reading.*
- *Real and theoretical systems (formulas) of the relationship between the results representation, will be able to understand the essential control system design.*
- *Expressed in terms of skills: be able to apply the CAD control system design.*
- *Conducted a simulation of the control system configuration be able to check the meaning of theoretical results numerically.*

Lesson plan content:

- *Part 1: Introduction.*
- *Part 2: Explain of the modern control theory (with octave): derivation of the linear approximation near equilibrium models, controllability observability, and realization.*
- *Part 3: Octave control system simulation: simulation exercise on the program. Differences in continuous system simulation and sampled-data system.*
- *Part 4: Design of control system transfer function area (1), description: Open-loop and feedback. Sensitivity function of the feedback control system analysis (understanding the trade-off. Waterbed phenomenon's theorem and board).*
- *Part 5: Design of control system transfer function area (2), description: Internal stability. Small gain theorem. Passivity theorem. Servo system and the internal model principle. Augmented system approach.*
- *Part 6: Design of control system transfer function area (3), description: 2-DOF control system. Control PID. Control I-PD.*
- *Part 7: Stabilizing controller parameterization (1) Description: LFT. Proved parameterization of stabilizing controllers.*
- *Part 8: The content of the stabilizing controller parameterization.*
- *Part 9: Control H ∞ (1), description: Advantages and positioning. Standard control problem. Such as the generalized plant.*
- *Part 10: Control H ∞ (2), description: The transfer function space solution (parameterization and model matching problem) Introduction.*
- *Part 11: Control H ∞ (3), description: design exercise using transfer function of the solution space H ∞ control.*
- *Part 12: The state space control system design (1), description: Lyapnov equation.*
- *Part 13: The state space control system design (2), description:*

Bounded Real Lemma, Riccati equations and stabilizing solution, Hamilton matrix.

- *Part 14: The Fundamentals of adaptive control (1), description: MIT rule. Configuration concept and how to guarantee stability.*
- *Part 15: The Fundamentals of adaptive control (2) Description: Attempts to design MRAC.*

Evaluation Method (General):

Required to submit a report two or three times. Report and may impose a simple homework separately.

Textbook: -

Message:

In this course using the control system CAD, and to consider various aspects of the matters that were repeated by professor.

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University **: *Yamaguchi University***
Faculty/Graduate School **: *Engineering/ Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Computational Elastic Mechanics***
Credit/unit **: 2**
Academic Staff/Lecturer **: Prof. Xian Chen**
Semester **: I**

An outline of the course:

CAE (Computer Aided Engineering) is becoming integral to the design of mechanical structures is an important tool for Finite Element Method (FEM) by learning the principles of structural analysis, to learn what materials go beyond the mechanics. This course discusses the finite element formulation of the basic theory of mechanics and elasticity by the finite element method to simulate in practice, theory and practice to learn the skill of the numerical simulation.

General aim of teaching:

Understand the basic theory of elastic mechanics and finite element method, finite element analysis that is fundamental.

Goals of Teaching:

- *Knowledge in terms of understanding:*
  - *Explain the concept of stress-strain tensor representation.*
  - *Explain the basic equations of elastic mechanics, etc. - virtual work principle.*
  - *Explain the basic algorithm of the finite element method.*
  - *Explain the basic theory structural analysis.*
- *Expressed in terms of skills:*
  - *Can simulation results to evaluate.*
  - *The results can be explained logically - Evaluation.*

Lesson plan content:

- *Part 1: Introduction to tensor analysis contents: concepts and tensor calculus.*
- *Part 2: What the stress and strain: concepts and applications of stress tensor and strain tensor.*
- *Part 3: What linear elastic constitutive law: the generalized Hooke's law; constitutive two-dimensional problem.*
- *Part 4: What basic equation of elastic mechanics: equilibrium equations, strain-displacement relation, constitutive law, boundary conditions.*
- *Part 5: Problem solving elastic dynamics content: airy function; infinite stress concentration.*
- *Part 6: What principle of virtual work: the derivation of the principle of virtual work.*
- *Part 7: Introduction to finite element contents: history of the finite element method applied; introduction of the concept with variable cross-section bars.*
- *Part 8: The content of the finite element formulation: weak form of boundary value problems.*
- *Part 9: Finite element discretization of contents: shape functions, stiffness matrix*
- *Part 10: The content isoparametric element: mapping of shape functions; numerical integration*
- *Part 11: What the various elements: a continuum element, structural element*
- *Part 12: The content of the finite element method practice: preparing for analysis, the analytical model building, setting analysis conditions, results evaluation*
- *Part 13: What simulation exercise: exercise for the FEM analysis software*
- *Part 14: What simulation exercise: exercise for the FEM analysis software*
- *Part 15: What simulation exercise: exercise for the FEM analysis software e*

Evaluation Method (General):

Made a presentation to the simulation results given task, to evaluate its contents. Reports will be evaluated from what is created.

Reference book:

- *Satoshi Izumi simulation / finite element practice, Shinsuke Sakai: Morikita publication, 2010*
- *Hisada, Toshiaki / Fundamentals of tensor analysis for nonlinear finite element method: Maruzen, 1999*
- *Akira Tanaka, Yoshihisa / elastic dynamics and finite element method, long S., T. Inoue: Rivers Publishing, 1995*

Message:-

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Phone: 0836-85-9146
Office hours

University **: *Yamaguchi University***
Faculty/Graduate School **: *Engineering/ Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Theory of Science and Technology (English B)***
Credit/unit **: 2**
Academic Staff/Lecturer **: Prof. Anthony Hoysted**
Semester **: I**
An outline of the course:
Based on every topics in each week class, students develop English language skills such as describing both natural and engineering processes (including causes and effect processes), describing procedures (example: safety, laboratory), describing and comparing the properties of different materials and their uses, outlining the components of a device and their function or purpose, logically analyzing, organizing and presenting the key features of a topic.
General aim of teaching:
This class develops technical and academic English skills (reading, writing, listening and speaking) for Master degree students.
Goals of Teaching:
Develops technical and academic English skills (reading, writing, listening and speaking) for Master degree students.
Lesson plan content:
A range of topics is introduced through reading and listening, for example, foundry and casting processes, occupational health and safety (example: regulations, hazard analysis), automated systems & sensors, materials recycling, natural cycles (example: water cycle), environmental science and assessment, materials used in engineering, appropriate technology, fuel cells, MEMS and nanotechnology.
Evaluation Method (General):
Assessment is based on the completion of a written English homework assignment each week.
Textbook: -
Message:-
Contacts:
anthony.hoysted@newcastle.edu.au

University **: *Yamaguchi University***
Faculty/Graduate School **: *Engineering/Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Theory of Computational Engineering***
Credit/unit **: 2**

Academic Staff/Lecturer **: Prof. Kakuji Ogawara**
Semester **: II**
An outline of the course:
Learn the basics of numerical simulations to understand the issues when the application note.
General aim of teaching:
- *Order to understand the types of errors due to numerical analysis. Depending on the type of partial differential equations.*
- *To know about the type and characteristics of the numerical solution. To understand the stability of the calculation scheme. Understanding about the solution of such equations of motion for fluid bodies in three dimensional.*

Goals of Teaching:
- *Understanding the perspective of knowledge: Understanding the type of error and order. Parabolic, elliptical, to understand the numerical solution of hyperbolic partial differential equations.*
- *To understand the stability of the scheme.*

Lesson plan content:
- *Part 1: Errors in Numerical Analysis*
- *Part 2: Solving ordinary differential equations (1)*
- *Part 3: Solving ordinary differential equations (2)*
- *Part 4: Solving ordinary differential equations (3)*
- *Part 5: Parabolic partial differential equation solver (1)*
- *Part 6: Parabolic partial differential equation solver (2)*
- *Part 7: 3-D rigid motion*
- *Part 8: Hyperbolic partial differential equation solver (1)*
- *Part 9: Solving hyperbolic partial differential equation (2)*
- *Part 10: Solving elliptic partial differential equations (1)*
- *Part 11: Solving elliptic partial differential equation (2)*
- *Part 12: Solving elliptic partial differential equation (3)*
- *Part 13: Fast Solution of simultaneous equations (1)*
- *Part 14: Fast Solution of simultaneous equations (2)*
- *Part 15: Summary*

Evaluation Method (General):
Assessed by final exam to exam and homework almost every time.
Textbook: -
Message: -
Contacts:
Office hours

University **: *Yamaguchi University***
Faculty/Graduate School **: *Engineering/Science and Engineering***
Major **: *Mechanical Engineering***

Lecture Subject Name **: *Theory of Viscous Hydrodynamics***
Credit/unit **: 2**

Academic Staff/Lecturer **: Assoc. Prof. Takatsugu Kameda**
Semester **: II**

An outline of the course:

Treatment leads to a fundamental equation of turbulence phenomena, to acquire a representative analysis of shear turbulence, such as boundary layer and jet.

General aim of teaching:

Turbulence phenomena are treated on the industry, either in theory and simulation methods of experimental effort is to be able to order that is based on the analysis and the basic equation.

Goals of Teaching:

- *Understanding the perspective of knowledge: to learn how to understand the structure of turbulence based on the understanding of the equations of motion of viscous fluid.*
- *Thinking in terms of decision: to master the ability to solve problems and appropriate selection of mathematical analysis and experimental facts.*
- *Motivation in terms of interest: challenges through the development of boundary layer using the law of similarity, that the practice of quantitative analysis of flow problems.*

Lesson plan content:

- *Part 1: Characteristics of the fluid contents: to understand the deformation of the rotating fluid and fluid substances.*
- *Part 2: What fundamental equations of viscous fluid: Navier-Stokes equations to derive the basic equations of viscous fluid are important to understand what physical quantities in order to understand the flow.*
- *Part 3: The content of the current state: to know the current state changes its parameters by parameters that govern the state and the flow of viscous fluid.*
- *Part 4: What's the basic equation turbulence: Navier-Stokes equations based on, to derive the basic equations of turbulence.*
- *Part 5: What Energy dissipation: to understand the energy dissipation means a change of kinetic energy into heat.*
- *Part 6: What the exact solution for laminar flow: from the basic equations to obtain the solution of the flow.*
- *Part 7: What laminar boundary layer: To understand the boundary layer approximation, to understand how to get a solution using the similarity of the flow.*
- *Part 8: Summary of part 1-part 7.*
- *Part 9: The contents of the turbulent boundary layer structure: understand the characteristics of a turbulent boundary layer of a multilayer structure.*
- *Part 10: The content of the velocity distribution of turbulent boundary layers: wall law, local law of similitude lead to defects such as speed laws to know the meaning of the assumptions that guide the law if necessary.*
- *Part 11: The content of the turbulent boundary layer drag laws: learn how*

to evaluate the resistance law using the law of the wall.

- *Part 12: The content of the flow tube flow: learning similarity law and turbulence structure in turbulent pipe flow.*
- *Part 13: The content of the jet stream: learning and turbulence structure in the jet similarity rule.*
- *Part 14: The content of the wake flow: learning similarity law and turbulence structure in the wake.*
- *Part 15: Content summary: review of the contents of the previous*
- *Part 16: Final exam*

Evaluation Method (General):
Evaluation based on periodic testing and reporting.
Textbook: -
Ikuo Nakamura/curing system hydrodynamics, Osaka Heroes: Kyoritsu Shuppan, 1985
Message: -
In order to understand the course content, please review the preparation. In particular, please make sure your own, such as derivation.
Contacts:
Mechanical Engineering Building, B308 room
E-mail: kameda@yamaguchi-u.ac.jp
Every Wednesday morning

Advanced Civil and Environmental Engineering
credit : 2
Academic staff : Several professors, Division Of Civil Engineering

This class treats basics of civil engineering and environmental engineering for all areas of the graduate students. Students who are interested in civil engineering and environmental engineering are welcome. This lecture will be held by the several professors of the department of civil and environmental engineering. The themes are; river and coastal environment, water quality, rivers hydraulics, coastal engineering, engineering project, structural design, soil mechanism, methane hydrate, bridge engineering and concrete materials. Reports on every part will be imposed on students. This class is intended for mainly international students. All the materials are written in English. Also, English is spoken by every staff.

Public Policy
credit : 2
Academic staff : Assoc.Prof. Hiroyuki Sakakkibara

Value of infrastructure development can be discussed by using some concepts in social sciences. In this subject, such concepts are explained. Contents of the subjects are as follows.

Externality (1) : Basic concepts of externality
Externality (2) : Externality in Environmental Problems
Externality (3) : Externality in transportation problem
Public goods (1) : Basic concepts of public goods
Public goods (2) : Provision of public goods
Public choice
Cost benefit analysis (1) : Basic concept
Cost benefit analysis (2) : Cost benefit analysis for road development
Cost benefit analysis (3) : Cost benefit analysis for environment
Cost benefit analysis (4) : Cost benefit analysis for disaster risk management
Social dilemma

Advanced Geo Informatics
Credit : 2
Academic staff : Prof. Masahiko Sekine
Prof. Norikazu Shimizu
Assoc. Prof. Koichi Yamamoto

This course contain lecture and exercise in recent progress on surveying, such as GPS (Global Positioning System), GIS (Geographic Information System) and application examples of these technique.

Contents of GPS presented by Prof. Shimizu are; Global Navigation Satellite System, Global coordinate system, Methods for positioning and Application of GPS for monitoring displacements.

Contents of GIS presented by Prof. Sekine are: Coordinate system and datum, Data transformation tools, Creating project on map and GIS exercise on management of ecosystem.

Contents on application presented by Prof. Yamamoto are: Deforestation and wild fire in Indonesia, Ground water/property of the peat soil, Planning static GPS and real time kinematic GPS survey and hybrid use with other equipment, and editing coastal bathymetry using raw GPS data and raw bathymetry data.

Students who learn this course will be able to 1. Explain about the recent progress on surveying, 2. Use GPS and GIS, 3.Explain about the application examples of the state-of-arts of surveying.

Science and Technology (English)
Credit :2
Academic Staff : Prof. Anthony Hoysted

Based on every topics in each week class, students develop English language skills such as describing both natural and engineering processes (including causes and effect processes), describing procedures (example: safety, laboratory), describing and comparing the properties of different materials and their uses, outlining the components of a device and their function or purpose, logically analyzing, organizing and presenting the key features of a topic. This class develops technical and academic English skills (reading, writing, listening and speaking) for Master degree students. Assessment is based on the completion of a written English homework assignment each week.

Math and Programming Using C
Credit :2
Academic Staff : Prof. Boyd Ernst Steve

This class introduce basic idea for science and technology, particulary understanding mathematical functions and learning how to write computer programs. The class uses English and students will be expected solve math problems and write C programs. Topic will include math function, how to graph function and how to design functions C programming language, introduction to the C programming language, LINUX operating system, Principals and usage of LINUX, digital electronics, concepts of gates, flip-flop, multiplexer and simple digital circuit and how to simulate them in C.

Study on symbiotic Environmental Science and Engineering 1
Credit :2
Academic Staff : Prof. Fusanori Miura

The purpose of this lecture is design to promote students motivation and ability for the study through the spontaneous research activity related to environmental science and engineering including chemical issue and biological issue. The theme of the research and the activity of the research are determine by each student

under the advice of the academic staff. The students are anticipated to make full use of study environment such as hardware, software and information provided. The result of the research activity will be included into the part of the student`s thesis

Seminar on symbiotic Environmental Science and Engineering 1
Credit :2
Academic Staff : Prof. Fusanori Miura

The purpose of this seminar is design to promote student`s ability of the research through the "Study On Symbiotic Environmental Science and Engineering 1" as well as to learn how to organize and form the research results. The students is supposed to report and explain regularly the research result to the academic staff. Based on the disscussion on the research result, the students learn the research activities such as methods, how to write paper, how to make presentation at the international conference, how to apply a project to get reserch budget and so forth.

3.3 Pola Perkuliahan

Kurikulum Program Studi magister ilmu Lingkungan disusun berbasis kompetensi berlandaskan visi, misi, sasaran dan tujuan yang telah ditetapkan. Kompetensi konsentrasi *environmental remote sensing*, tercermin pada mata kuliah *Disaster Mitigation, Environmental Fluid Dynamics, Space Engineering & Satellite Remote Sensing, Advanced Geoinfomatics, Climate Change,* dan *Oceanography*. Sebagian besar dari mata kuliah di ajarkan dalam *shared lecture program*. Untuk meningkatkan kompetensi mahasiswa, terutama dalam melakukan program penelitian, maka diselenggarakan seminar mingguan rencana penelitian mahasiswa, dan penulisan proposal penelitian dan tesis, dengan bimbingan dari staf dan Guru Besar dari Jepang.

Kebutuhan masyarakat saat ini adalah pengkajian dan pemecahan masalah lingkungan yang dapat didekati dari berbagai aspek. munculnya fenomena perubahan iklim (*Climate Change*) beberapa tahun belakangan berpengaruh terhadap berbagai aspek kehidupan di dunia. Oleh karena itu,

Program Studi Magister Ilmu Lingkungan menyediakan mata kuliah perubahan iklim (*climate change*) yang khusus membahas permasalahan perubahan iklim. Usaha pemecahan fenomena perubahan iklim juga dilakukan dengan mendorong mahasiswa mengambil tema-tema penelitian tugas akhir (tesis) terkait perubahan iklim. Hal ini dimaksudkan untuk mengimplementasikan visi-misi Program Studi Magister Ilmu Lingkungan untuk dapat mencetak sumberdaya manusia yang kompetitif, serta memberikan sumbangsih terhadap pemecahan permasalahan lingkungan di Bali, Indonesia, bahkan dunia.

Lulusan dari program ini diharapkan lebih peka terhadap masalah-masalah lingkungan dan mampu memecahkannya secara komprehensif. Lulusan juga diharapkan dapat mempublikasikan hasil-hasil kajiannya lebih banyak melalui media diskusi maupun media tulis, baik jurnal maupun media masa, dengan tetap menghayati dan menjalankan arti dari etika ilmiah yaitu kejujuran ilmiah.

Materi-materi kuliah yang diajarkan di kelas, beberapa diantaranya diaplikasikan dalam bentuk praktikum, sedangkan integrasi dari berbagai mata kuliah diaplikasikan lewat praktek kerja lapangan yang memiliki permasalahan yang multi disiplin. Di samping itu, dalam seminar proposal dan kolokium, materi yang disajikan beragam sesuai dengan minat tiap mahasiswa, sehingga mahasiswa yang lain didorong untuk mengerti hal-hal lain yang kurang diminatinya. Disini akan terjadi pengkayaan sekaligus integrasi dari multi disiplin yang dimiliki mahasiswa dan dosen.

Mahasiswa diberi kebebasan memilih materi riset yang diminati dan yang dikuasai. Dengan demikian, kemampuan ilmiahnya berkembang sesuai dengan keinginan masing-masing. Dosen pembimbing hanya bersifat mengarahkan agar tujuan yang ingin dicapai oleh tiap mahasiswa dapat tercapai dengan lebih baik.

3.4 Peserta *Double Degree Program*

Peserta Program *Double Degeee Program* Studi Magister Ilmu Lingkungan Program Pascasarjana Universitas Udayana pada tahun ajaran 2011/2012 diikuti oleh tiga orang mahasiswa seperti disajikan padaTabel 6.

Tabel 6 Daftar Nama Mahasiswa Peserta *Double Degree Program*

No	Nama Mahasiswa	Tempat Tanggal lahir	Jenis Kelami	Alamat	Email	Program Studi	Konsentrasi
1	Martiwi Diah Setiawati	Klaten, 18 Februari 1987	Perempuan	Polodadi RT 01 RW 07 Mrisen Juwiring Klaten-Jateng	tiwix_cute@yahoo.co.id	PS Magister ilmu Lingkungan PPs Unud	*Environmental Remote Sensing*
2	Putu Aryastana	Mayong, 2 Pebruari 1982	Laki-laki	Jl.Gajar Waktra IX No 14 Peguyangan kaja, Denpasar	aryastanaputu@yahoo.com	PS Magister ilmu Lingkungan PPs Unud	*Environmental Remote Sensing*
3	Masita Dwi Mandini Manessa	Tangerang, 02 Nopember 1986	Perempuan	Jl. Pengadilan Blok B1 no 5 Tangerang	manessa-djenar@yahoo.co.id	PS Magister ilmu Lingkungan PPs Unud	*Environmental Remote Sensing*

BAB IV

PENUTUP

Ciri Program Studi Magister Ilmu Lingkungan Program Pascasarjana Universitas Udayana adalah penanganan masalah lingkungan dari berbagai sudut pandang dan dari berbagai disiplin ilmu yang telah dilengkapi dengan pengetahuan di bidang lingkungan. Latar belakang kegiatan bersumber dari berkembangnya pembangunan di segala bidang yang mengakibatkan terjadinya tekanan yang semakin tinggi terhadap lingkungan alam dan buatan. Tekanan tersebut diantaranya berupa eksploitasi sumberdaya alam secara berlebihan, berkurangnya lahan produktif serta terjadinya konflik antar sektor yang semakin serius. Oleh karena itu, sudah seyogyanya sangat diperlukan semakin banyak tenaga ahli lingkungan yang memiliki wawasan global dengan tetap berlandasan kearifan lokal, sehingga pelaksanaan penanganan permasalahan lingkungan dapat dilakukan secara komprehensif, dengan memperbesar manfaat dan memperkecil risiko dari peningkatan kegiatan pembangunan, sehingga proses pembangunan dapat terlaksana secara berkelanjutan (*sustain*). Penyiapan sumberdaya manusia yang berwawasan global dilakukan dengan memberikan atmosfer internasional dalam proses pembelajaran, melalui *Double Degree Program* di Program Studi Magister Ilmu Lingkungan Program Pascasarjana Universitas Udayana, bekerjasama dengan *Graduate School of Science and Engineering Yamaguchi University.*