

PRESENTATION SCHEDULE

IMRC SEMINAR 2018- 11th floor Research Centre Building

TIME (WIB)	PROGRAM		
	Wednesday, 21 November 2018		
08.30 - 09.00	Registration		
09.00 - 10.00	<p style="text-align: center;">Opening Ceremony</p> <ul style="list-style-type: none"> • Indonesia Raya, Indonesia National Anthem • Negaraku, Malaysia National Anthem • Safety Induction • Remo dance • Conference Chairman • ITS Rector • UTM Vice Chancellor <p style="text-align: right;">(All Audience)</p>		
10.00 - 11.15	<p style="text-align: center;">Keynote Speaker</p> <p>Session Chair : Dr. Harus Laksana Guntur</p> <ul style="list-style-type: none"> • Prof. Adi Soeprijanto - ITS • Prof. Arshad Ahmad - UTM <p style="text-align: right;">(All Audience)</p>		
11.15 – 12.00	Lunch break and Pray		
Parallel Session	Energy (ITS-1) 11 st Floor RC Chair :Dr Ali Musyafa	Material (ITS-2) 10 th Floor RC Chair :Dr M Zainuri	Engineering (ITS-3) 10 th Floor RC Chair : Hendro , Ph.D
12.00 - 12.30	Keynote Parallel 1	Keynote Parallel 3	Keynote Parallel 5
12.30 - 13.00	Keynote Parallel 2	Keynote Parallel 4	Keynote Parallel 6
13.00 - 13.15	IM-E-14	IM-M-01	IM-T-01
13.15 - 13.30	IM-E-28	IM-M-02	IM-T-02
13.30 - 13.45	IM-E-29	IM-M-03	IM-T-03
13.45 - 14.00	IM-E-30	IM-M-04	IM-T-04
14.00 - 14.15	IM-E-31	IM-M-05	IM-T-05
14.15 - 14.30	IM-E-01	IM-M-06	IM-T-06
14.30 - 14.45	IM-E-02	IM-M-07	IM-T-07
14.45 - 15.00	IM-E-03	IM-M-08	IM-T-08
15.00 - 15.30	Coffee break and Pray		
	Chair :Dr Setiawan	Chair :Lalu M, Ph.D	Chair :Dr Fredy
15.30 - 15.45	IM-E-04	IM-M-09	IM-T-09
15.45 - 16.00	IM-E-05	IM-M-10	IM-T-10
16.00 - 16.15	IM-E-06	IM-M-11	IM-T-11
16.15 - 16.30	IM-E-07	IM-M-12	IM-T-12
16.30 - 18.00	Break and Pray		

18.00 - 21.00	Gala Dinner Lobby Floor at Research Center Building		
Thursday, 22 November 2018			
Parallel Session	Energy (ITS-1) 11 st Floor RC	Material (ITS-2) 10 th Floor RC	Engineering (ITS-3) 10 th Floor RC
	Chair :Dr Susianto	Chair :Dr Setiawan	Chair :Dr Agus S
09.30 - 10.00	Keynote Parallel 7	Keynote Parallel 8	Keynote Parallel 9
09.30 - 10.15	IM-E-08	IM-M-13	IM-T-13
10.15 - 10.30	IM-E-09	IM-M-14	IM-T-14
10.30 - 10.45	IM-E-10	IM-M-15	IM-T-15
10.45 - 11.00	IM-E-11	IM-M-16	IM-T-16
11.00 - 11.15	IM-E-12	IM-M-17	IM-T-17
11.15 - 11.30	IM-E-13	IM-M-21	IM-T-18
11.30 - 12.30	Lunch break and Pray		
	Chair :Dr Harus	Chair :Dr Ervina	Chair : Eko S, Ph.D
12.30 - 12.45	IM-E-15	IM-M-20	IM-T-19
12.45 - 13.00	IM-E-16	IM-M-22	IM-T-20
13.00 - 13.15	IM-E-17	IM-M-18	IM-T-21
13.15 - 13.30	IM-E-18	IM-M-23	IM-T-22
13.30 - 13.45	IM-E-19	IM-M-24	IM-T-23
13.45 - 14.00	IM-E-20	IM-M-25	IM-T-24
14.00 - 14.15	IM-E-21	IM-T-27	IM-T-25
14.15 - 14.30	IM-E-22		IM-T-26
14.30 - 15.00	Coffee break and Pray		
	Chair :Hakun, Ph.D		
15.00 - 15.15	IM-E-23		
15.15- 15.30	IM-E-24		
15.30 - 15.45	IM-E-25		
15.45- 16.00	IM-E-26		
16.00 - 16.15	IM-E-27		
16.15- 16.30			
16.30 - 17.00	Closing Ceremony		

ITS-1 ENERGY

No	PAPER ID	Authors	Title	Bidang
1	IM-E-01	Wahyu Diono	Lipid Recovery from Wet Desmodemus sp for Biofuel Production by Liquefied Dimethyl ether	Energi
2	IM-E-02	Aryoseno and Ervina Ahyudanari	Criteria Analysis in Selection Method of Mud Pumping in Coal Mining Project	Energi
3	IM-E-03	Mohammad Berel Toriki, Bambang Lelono Widjiantoro and Arief Abdurrakhman	Design of Output Power Control System Based on Mass Flowrate Comparison of Air and Fuel Ratio (AFR) on Dual Fuel Generator Set by using PID Control Method	Energi
4	IM-E-04	Setiyo Gunawan, Hakun Wirawasista Aparamarta, Arief Prayogo and Shelma Hajar Anugrah Putri	Separation and Purification of Triglyceride from Nyamplung (<i>Callophyllum inophyllum</i>) Seed Oil as Biodiesel Feedstock by Using Continuous Countercurrent Extraction	Energi
5	IM-E-05	Himsar Ambarita	Experimental study on diesel engine coupled with a catalytic converter run on dual-fuel mode using biogas produced from agricultural waste	Energi
6	IM-E-06	Hendro Juwono, Krisna Nugroho, Riza Alfian, Ahmad Amrullah, Arifah Nurfitriyah and Fredy Kurniawan	Alternative Biofuel from Polypropylene Plastic Wastes with Co-Reactant Waste Cooking Oil and its Characteristic Performance	Energi
7	IM-E-07	Ahmad Anwarud Dawam, Djarot Sugiarto, Yuly Kusumawati, Mardi Santoso, Suprpto Suprpto, Eko Santoso, Ratna Ediaty, Didik Prasetyoko and Muryani Muryani	Production, separation, and fuel properties of liquid fuel from plastic waste using simple pyrolysis reactor connected fractional distillation	Energi
8	IM-E-08	Mustafa Kamal, Sudarno and Wahyudi	Variation Analysis Of Collector Shift Time Period On Solar Water Heater Efficiency	Energi
9	IM-E-09	Wahidin Nuriana, Agus Suryanto and Mustafa Kamal	Calorific Value Analysis, Reduction of Period Weight, Reaction Rate, Activation Energy of Old Coconut, Young Coconut Waste Briquette Burning, Cocoa	Energi
10	IM-E-10	Asgar Alie and Purwadi Agus Darwito	Improvement of Engine Oil Lifetime by Using Additional Filter A Case Study in PT. Vale Sorowako	Energi

11	IM-E-11	Dori Yuvenda, Bambang Sudarmanta and Arif Wahyudi	Characterization of Engine Performance, Combustion Process and Emission of Diesel/CNG Dual Fuel Engines with Pilot Injection Timing Variation at Low Load	Energi
12	IM-E-12	Madi Madi, Muhammad Ermando Nurman Sasono, Yoyok Setyo Hadiwidodo and Septia Hardy Sujiatanti	Application of Savonius Turbine Behind The Propeller as Energy Source of Fishing Vessel in Indonesia	Energi
13	IM-E-13	Bagus Catur Pamungkas and Harsono Hadi	Potential of Biomass Utilization in Rotary Kiln of Nickel Processing Plant	Energi
14	IM-E-14	Semin, Muhammad Badrus Zaman, Aa, Nilam Sari Octaviani and Rosli Abu Bakar	Investigation of intake valve lift effect on air-fuel mixing of CNG-diesel engine based on CFD simulation	Energi
15	IM-E-15	Thariq Arafatul Akbar, A. A. B. Dinariyana, Alam Baheramsyah, Fadilla Indrayuni Prastyasari and Putri Dyah Setyorini	Risk Assessment on Liquefied Petroleum Gases (LPG) Handling Facility, Case Study: Terminal LPG Semarang	Energi
16	IM-E-16	Wiwiek Hendrowati, Harus Laksana Guntur and Aida Annisa Amin Daman	Energy Harvesting and Vibration Reduction Analysis on Cantilever Piezoelectric Double Vibration Absorber (CPDVA) Mechanism	Energi
17	IM-E-17	Erwandi Erwandi, Daif Rahuna and Cahyadi S.J. Mintarso	The Development of the IHL Wave-Current Turbine to Convert the Ocean Energy from Both Wave and Current	Energi
18	IM-E-18	Jubilate Sihombing, Wien Lestari, Mariyanto Mariyanto and Wiwid Joni	Subsurface Analysis Using Gravity Data at Lili Sepporaki Geothermal Area	Energi
19	IM-E-19	Pramoda Agung Sumadhijono, Bambang Sudarmanta and Arif Wahyudi	Effect of Jet Speed on LPG To Flame Stability and Flame Temperature Distribution on Inverse Difusion Flame (IDF)	Energi
20	IM-E-20	Siti Zullaikah	Effect of blending ratio of co-pyrolysis of oil palm empty fruit bunch and low rank coal using CO ₂ as purge gason gas, tar and char characteristics	Energi
21	IM-E-21	Adelia Riska Pratiwi, Cynthia Aprilia Puteri, Suprpto, Yatim Lailun Ni'mah	The application of recycled pre-lithium graphite as a new lithium ion battery anode material	Energi

22	IM-E-22	Hakun Wirawasista Aparamartaa, Safrina Hapsaria, Setiyo Gunawana, Badril Azhara, Hanggoro Tri Adityaa, Yi- Hsu Jub	The Election of Edible and Non Edible Crop for Biodiesel Feedstock in Indonesia with AHP-BCR and GC Analysis	Energi
23	IM-E-23	Totok Soehartanto, Sarwono, Roekmono dan Matradji	Impact Overall Thermal Transfer Value to Cooling Load of Research Centre ITS	Energi
24	IM-E-24	Totok Soehartanto, A. Abdurrahman; H Sufyan	Biogas Purification using Serial Wet Scrubber	Energi
25	IM-E-25	Siti Zullaikah, Arsita Permatasari, Indah marita and M. Rachimoellah	Effect of catalytic in situ production of biodiesel on the total sugars of deafted rice bran	Energi
26	IM-E-26	Siti Zullaikah, Mardiah, M. Rachimoellah, and Binti Kualifatul Rosydh	Co-pyrolysis of low rank coal and oil palm empty fruit bunch: effect of temperature and blending ratio on product distribution	Energi
27	IM-E-27	Akhmad Afrizal Rizqi, Aripriharta Mr., I Wayan Dasna and Purnomo Mr.	Experimental Validation of the Piezoelectric Energy Harvester for Wearable Devices	Energi
28	IM-E-28	H Juwono, K A Nugroho, R Alfian, A A Y Amrullah, A Nurfitriyah and F Kurniawan	Alternative Biofuel from Polypropylene Plastic Wastes with Co-Reactant Waste Cooking Oil and its Characteristic Performance	Energi
29	IM-E-29	SM Hussin, S. Zemri, M.Y. Hassan, N.Rosmin, DM Said ,M. Rasid,	Economic and Environmental Impact Analysis of Grid-Connected Photovoltaic and Fuel Cell hybrid System for Langkawi SkyCab Operation	Energi
30	IM-E-30	SM Hussin, M.Y. Hassan, N.Rosmin, DM Said, MP Abdullah, MA Ahmad,	Optimization of Coordinated Generation and Transmission Maintenance Scheduling with Security-constrained Unit Commitment using MILP Based Approach: A Malaysian Practice	Energi
31	IM-E-31	Lee Soo Eau, Norzanah Rosmin*, Aede Hatib Mustaamal	Street Lighting using Hybrid Solar/Micro Wind System for UTM Campus	Energi

ITS-2 MATERIAL

No	PAPER ID	Authors	Title	Bidang
1	IM-M-01	Rahizana Mohd Ibrahim and Masturah Markom	Physical and optical Characterization of Mn-Doped ZnS Nanoparticles Prepared via Reverse Micelle Method Assisted by Compressed Co ₂	Material
2	IM-M-02	Yatim Ni'Mah and Vennycha Ameswari	Determination of Shelf Life and Proximate Analysis of Orummy Beverage Produced by Micro, Small and Medium Enterprise INOKAM in Dolly Distric	Material
3	IM-M-03	Noor Syazwanie Rusmi, Nik Hafiy Hafizi Nik Rahimy, Muhammad Nur Nazmi Abd Rashid and Kiki Adi Kurnia	Multilinear Modelling of Hydrogen Sulfide Solubility in Aqueous Alkanolamine	Material
4	IM-M-04	Muhammad Nur Nazmi Abd Rashid, Noor Syazwanie Rusmi, Nik Hafiy Hafizi Nik Rahimy and Dr Kiki Adi Kurnia	Modelling of CO ₂ Solubility in Binary Mixture of Alkanolamine and Ionic Liquid	Material
5	IM-M-05	Nik Hafiy Hafizi Bin Rahimy, Noor Syazwanie Rusmi and Muhammad Nur Nazmi Abd Rashid	Prediction Solubility of H ₂ S in Ionic Liquid by using Group Contribution Method	Material
6	IM-M-06	Devita Rachmat and Doty Risanti	Study on The Structural Evolution of SiO ₂ Extracted from Sidoarjo Mud	Material
7	IM-M-07	Subandrio Soemali, Wiwik Dahani, Muhammad Alghifari, Taat Tri Purwiyono and Djoko Hartanto	Enrichment Chromite Sand Grade Using Magnetic Separator	Material
8	IM-M-08	I Made Londen Batan	Tricycle for Physical Therapy for Stroke Patients	Material
9	IM-M-09	R Bayuaji, D P Dibiantara, R Ilmiah, N A Husin, MS Darmawan, R Buyung, S Subekti	The Effect of Rice Husk Ash Addition As Pozzolan On Geopolymer Binder Using Alkali Activators	Material
10	IM-M-10	Ruslan Hidayat	Alternative of stone ash as a sand replacement in fc '40 mpa quality concrete mixture on pressure stress	Material
11	IM-M-11	Ita Sulistyani, Kartika Dewi, Suprpto Suprpto and Yatim Ni'Mah	Adsorption of Indigosol Dye Waste from Batik Home Industry at Ex Redlight District, Dolly, Surabaya using Activated Carbon	Material
12	IM-M-12	Mohammad Isa Irawan	Implementation of Self-Organizing Fuzzy Maps on Incomplete Data for Nutritional Clustering of Foodstuffs	Material
13	IM-M-13	Irfan Marwanza, Andre Susilo, Febrilia Agar Pramesti, Riskaviana Kurniawati, Wiwik Dahani	The Effect of Chemical and Mineral Composition on Rock Mass Strength (Case Study of Kaliwadas Limestone Hill, Karangsambung, Kebumen, Central Java)	Material
14	IM-M-14	Ani Iryani, Stella Jovita, Febrilia Agar Pramesti, Riskaviana Kurniawati	The effect of 2 propanol to TiO ₂ / ZSM-5 composite morphology	Material

15	IM-M-15	Irfan Marwanza, Wiwik Dahani, Rosiana Safitri, Agung Bagus Pambudi, Muhammad Iran Rizki	The Relevancy Of Mineral Composition To Rock Shear Strength in Kaliwadas Hills, Karangsembung, Kebumen	Material
16	IM-M-16	Agung Bagus Pambudi, Dwi Novi Cahyanti, Wahyu Prasetyo Utomo, Djoko Hartanto	On The Synthesis of ZSM-5 Directly from Kaolin Bangka with Aging Time	Material
17	IM-M-17	Wahyu Prasetyo Utomo, Aras Suci Wijayanti, Sillvana Nurherdiana, Rendy Muhammad Iqbal and Hamzah Fansuri	Preparation and Morphological Property of $\text{Co}_3\text{O}_4/\text{Ba}_x\text{Sr}_{1-x}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ ($x=0.5-0.7$) Flat Sheet Membranes using Starch as Binder Agent	Material
18	IM-M-18	Nurul Widiastuti*, Yuniar Venta Tyas Puspita, Anggita Rara Kumala Wardhani	Synthesis zeolite-X supported on glass wool at various hydrothermal time for carbon dioxide adsorption	Material
19	IM-M-20	Raudhatu Shalihah, Nuni Widiarti, Suprpto, Emsal Yuniar, Didik Prasetyoko	Modified Zn to Indonesian natural calcite as heterogeneous catalysts for biodiesel production from reutealis trisperma oil	Material
20	IM-M-21	Dinny Harnany, Muhammad Akbar Al-amin, I Made Londen Batan	Experimental Study Of Influence Injection Moulding on Shrinkage Material Sisal-Glass Fiber Biocomposite Using Response Surface Methodology	Material
21	IM-M-22	Novia Amalia Sholeha, Lailatul Jannah, Hannis Nur Rohma, Nurul Widiastuti, Hartati, Didik Prasetyoko	Synthesis and characterization of Y-type zeolite from activated Bangka Belitung's kaolin using sulfuric acid	Material
22	IM-M-23	Reva Edra Nugraha, Imroatul Qoniah, Suprpto, Didik Prasetyoko	Optimization synthesis of hierarchical ZSM-5 from Bangka Belitung's kaolin : effect of time and temperature crystallization	Material
23	IM-M-24	S.D. Nurherdiana, N. Khoiroh, A.M. Ilham, R.M. Iqbal, W.P. Utomo, H. Fansuri	Morphology and Physical Properties of $\text{La}_{0.7}\text{Sr}_{0.3}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-\delta}$ (LSCF 7328) Membrane Fabricated via Phase Inversion-Sintering Route : Effect of PEG Molecular Weight Additive	Material
24	IM-M-25	Nova Widayanti and Ervina Ahyudanari	Usage of Power Plant Waste for Airport Pavement Surface	Material

ITS-3 ENGINEERING

No	PAPER ID	Authors	Title	Bidang
1	IM-T-01	Asyari Daryus, Ahmad Indra Siswantara, Budiarmo Budiarmo, Gun Gun Ramdhan Gunadi and Hariyotejo Pujowidodo	Turbulent Parameter Analysis of Two Different Turbulence Models in CFD Simulation of Two-Dimensional Gas-Solid Fluidized Bed	Engineering
2	IM-T-02	Yan-Wei Wu	Fatigue Calculation of Offshore Jacket Structure For Monitoring	Engineering
3	IM-T-03	Siti Machmudah, Sugeng Winardi, W Wahyudiono, Motonobu Goto and Hideki Kanda	Water Removal from Wood Biomass by Liquefied Dimethyl Ether for Enhancing Heating Value	Engineering
4	IM-T-04	Steven Chandra, Willy Dharmawan, Famelia Nurlaela, Muhammad Agus Syahputra and Sudjati Rachmat	Hydraulic Fracturing as A Solution for Encouraging Economically Viable Development of Geothermal Energy in Indonesia's Gross Split System	Engineering
5	IM-T-05	Adim Firmansah, Aripriharta Mr., Nandang Mufti, Arif Nur Affandi and Ilham Ari Elbaith Zaeni	Self-powered IoT Based Vibration Monitoring of Induction Motor for Diagnostic and Prediction for Failure	Engineering
6	IM-T-06	Kusmayanto Hadi Wibowo, Aripriharta Mr., Markus Diantoro, Slamet Wibawanto, Kartika Candra Kirana, Fitrah Wicaksono Yunianto Saputro and M Nuzulul Chanif	IoT-based Control and Monitoring for DC Motor Fed by Photovoltaic System	Engineering
7	IM-T-07	Sutomo, Wahidin Nuriana, Sutrisno and Joko Triono	Effect of Vacuum Level on Heating Speed on Ethanol Distillation Process Using Coaxial Vacuum Tube Solar Collector	Engineering
8	IM-T-08	Rickson Mauricio and Abdul Wahid Surhim	Control of Gas Dehydration Unit Using Multivariable Model Predictive Control (MMPC) to Obtain More Optimal Control Performance	Engineering
9	IM-T-09	Nanthinie Thangarajoo, Pranesh Matheswaren, Kiki Adi Kurnia and Khairiraihanna Johari	Development of Group Contribution Model to Predict Activity Coefficient of Alcohol at Infinite Dilution in Ionic Liquids	Engineering

10	IM-T-10	Bambang Sudarmanta, Dhesa Hidayatulloh, Depi Rustam Ependi, Arif Rahman Saleh, Atok Setiyawan and Ary Bachtiar Krishna Putra	Numerical Study of the Effect of Oxidation Zone Inlet Air Temperature Variation on Municipal Solid Waste Pellet Gasification Process on Downdraft Type Reactor Characteristics	Engineering
11	IM-T-11	Bambang Sudarmanta, Atok Setiyawan, Ari Bachtiar Krisna Putra and Dori Yuvenda	Effects of Advancing the Pilot Injection Timing on The Engine Performance, Combustion and Emissions on Diesel dual fuel Engines at High Load	Engineering
12	IM-T-12	Dian Purnamasari, I Ketut Aria Pria Utama and I Ketut Suastika	Verification and validation study of the resistance model of tanker 17.500 DWT	Engineering
13	IM-T-13	Gema Setyawan, Umar, Adi Soeprijanto and Ontoseno Penangsang	Symbiotic Organism Search for Sizing and Optimal Location of Distributed Generation Using Novel Sensitivity Factor	Engineering
14	IM-T-14	Feby Muqtadiroh, Anisah Herdiyanti, Indra Wicaksono and Tsuyoshi Usagawa ^{2*}	Analysis of Factors Affecting Continuance Intention of E-Learning Adoption in Lecturers' Perspectives	Engineering
15	IM-T-15	Dicky Satriananda, Sutopo Fitri and Taufik Nugroho	Vapour Absorption Chiller System on Frigate Using the Main Engine Exhaust Gas	Engineering
16	IM-T-16	I Made Londen Batan and Baskara Wiana	Design of Ironing Dies by Using CAD/CAM TopSolid7 for Making 20 Millimeter Caliber Bullet Case	Engineering
17	IM-T-17	Erma Hakim Setyawan	Estimation of Hourly Solar Radiation on Horizontal Surface Using GAMF (Genetic Algorithm Modified Fuzzy) (Case Study in Surabaya)	Engineering
18	IM-T-18	Arif Rahman Saleh, Bambang Sudarmanta and Depi Rustam Ependi	Numerical Analysis of Heterogeneous Oxidation Reaction on Multi-stage Air Inlet Downdraft Gasifier	Engineering
19	IM-T-19	I Wayan Gede Krisna Dwipayana Darma Putra, Ketut Buda Artana, I Made Ariana and Luh Gede Mirah Pardani Sudiasih	A Study on Conceptual Design of Mini FSRU as LNG Receiving Facility	Engineering
20	IM-T-20	Briansyah Setio and Siti Rochimah	Error Message Quality of Web Form : Assessment on Existing Parameters	Engineering
21	IM-T-21	Edwin Riksakomara	Not Perform Loan (NPL) Forecasting Scale in Indonesia using Adaptive Neuro-Fuzzy Inference System (ANFIS) Method	Engineering

22	IM-T-22	Adi Soeprijanto*, Rony Seto Wibowo, Dinar Setya Pratama	Power System Optimal Operation with Dynamic Stability Constraint	Engineering
23	IM-T-23	Rully Soelaiman	Hybrid Saliency-SVM Method Implementation for Automatic Data Training Selection in Image Segmentation	Engineering
24	IM-T-24	Baroto Tavip Indrojarwo	Exterior Electric Hatchback Crossover Car Design with Strong, Vicious and Sharp Concept	Engineering
25	IM-T-25	H L Guntur, A A A Daman and W Hendrowati	The Vibration Reduction in Multilevel Structure Model with the addition of Tuned Liquid Column Damper (TLCD):Study of the Influence of variations in TLCD's mass ratio & orifice cross-sectional area	Engineering
26	IM-T-26	Mochammad Kemal Achriansyah, Ontoseno Penangsang*, Teguh Yuwono	Analysis of Conservation Voltage Reduction (CVR) in Microgrid Distribution Network Using Line Drop Compensator (LDC)	Engineering
27	IM-T-27	Nor Shahida Hasan1, Norzanah Rosmin2*, Nor Julia Mohd Nordin3, Saifulnizam Mohd Khalid4, Aede Hatib Mustaamal5, Siti Maherah Husin6	Virtual Inertia Support using Supercapacitor for Wind Turbine System	Engineering