FAR WESTERN UNIVERSITY

FACULTY OF ENGINEERING

OFFICE OF THE DEAN

MAHENDRANAGAR, KANCHANPUR, NEPAL

GUIDELINES FOR BE ENTRANCE

EXAMINATION

(2079/80)

1.0 Introduction

Far Western University (FWU) was established in 2010 through an Act of Parliament as a government-funded university. Its main vision is to become one of the leading academic institutions in Nepal with its strategic focus on academic excellence, creative innovation and research based education. The strategic location of the University at the Sudurpaschim Province would not only support improving the access of local people to higher education but also create dynamism on the overall development of the region. The central office of the university is located at Bheemdatta Municipality of Kanchanpur district. Since its inception, FWU has been striving to fulfill its responsibility of making higher education accessible to the people of this province and the nation.

With its aim to provide quality technical education and to expand the capacity of the university, FWU started Bachelor of Civil Engineering Program (4 Year Program) in 2014 at School of Engineering. It has also started Bachelor of Computer Engineering programme from the academic year 2077/78. All the academic programs in engineering education are run under the Faculty of Engineering (FOE).

2.0 Details of Academic Programmes running at Faculty of Engineering

SN	Programme	Duration		Number of Students		
		Year	Semester	Regular	Full-Pay	Total
1	Bachelor of Civil Engineering	4	8	24	24	48
2	Bachelor of Computer Engineering	4	8	24	`24	48

3.0 Entry Requirements

3.1	Requirements for score/grade in National Examination Board (NEB) exam or equivalent
	• Candidates should have studied at least one course on Physics (P), Chemistry(C) and Mathematics (M) and passed SLC (class 12) examination of NEB or equivalent level from a recognized academic institution. • Candidates should have scored a minimum of 45% or CGPA of 2 (in a scale of 4) and at least Grade C (in case of A-level, at least Grade D) or 45% in each subject (P, C, M). The minimum criteria for Grade C (in case of A level, Grade D) do not apply for other courses, including extra courses if any.
3.2	**Requirements for Mathematics in SLC (class 12) examination of NEB or**

	equivalent: Candidates should have studied at least 100 marks of mathematics in SLC(class 12) examination of NEB or equivalent level.

4.0 Syllabus Structure and Contents

4.1	**Weightage in Mathematics (M), Physics (P), Chemistry (C) and English (E):** The weightage for M, P, C, and E for the entrance examination syllabus shall be 40%, 30%, 20% and 10%, respectively.
4.2	**Syllabus Contents:** The contents of syllabus for P, C, M, and E are provided in Section 11 of this guideline.

5.0 Application Submission Process

5.1	**Publication of entrance notice**: The entrance notice shall be published usually 35 days ahead of the entrance schedule /date
5.2	**Mode of application submission**: The application shall be submitted Online
5.3	**Application processing fee:** Application processing fee shall be NRs 2500. Far Western University may increase application fee by up to 10% per year.
5.4	**Application submission pack:** The application submission pack shall include:
	o Citizen certificate in case of Nepali citizen and copy of passport and/or national identity document in case of foreign students. o Copies of certificates (transcript/mark-sheet/grade-sheet, provisional certificate, transfer certificate, and character certificate) of SEE (or equivalent) and SLC (class 12) examination of NEB (or equivalent classes). o Candidates applying for inclusive scholarship have to compulsorily submit necessary certificates/documents of respective category. In the absence of the required documents, Scholarship will not be provided. o Equivalence certificate for those who passed exam other than NEB/CTEVT. o Students waiting for results may also apply provisionally, but they are required to submit all/complete documents at the time of admission.

6.0 Scholarship Provision

Far Western University offers Scholarship to 24 students in each Engineering programme under different categories including merit-based scholarship, inclusive scholarship, district-wise scholarship, backward region scholarship, and staff quota.

7.0 Scholarship category and selection criteria:

7.1	Merit list of students passing the Entrance Examination will be prepared first, and then students will be selected for scholarship and admission on the basis of their entrance score/merit list.
7.2	Seven students (including 1 Woman) will be provided merit-based scholarship (Top Seven Rank Holders including 1 Woman).
7.3	Six students will be provided scholarship in an inclusive category including Women (n=1), Madhesi (n=1), Dalit (n=1), Aadibasi/Janjati (n=1), Disable (n=1) and Backward

	region (n=1)
7.4	Nine students will be provided district-wise scholarship, one student from each district of Sudurpaschim Province.
7.5	Two students will be provided scholarship on staff-quota. For staff quota, the candidate must be a permanent staff/teacher of FWU or son/daughter of the permanent staff/teacher of FWU. The permanent staff/teacher must have completed the provisional (Trial) service period of one year to be eligible for the staff quota.
7.6	Candidates should fill the application form appropriately and must be readable.
7.7	For the disable category, the scholarship priority will be provided on the basis of type of disability of the student such as 'Ka', 'Kha', 'Ga', and 'Gha' respectively and then the entrance score secured by the candidate.
7.8	Students applying for the district-wise scholarship quota (Nine district of Sudurpaschim Province such as Darchula, Baitadi, Dadeldhura, Kanchanpur, Kailali, Doti,Achham, Bajura and Bajhang) and backward region scholarship quota must be a permanent resident of any one districts mentioned above and must have completed SEE or equivalent examination from the government-funded community school of the same district. If there is no such students eligible for the scholarship, students who have passed SEE or equivalent degree from the community school of any one of the districts, and is a permanent resident of same district will not be restricted to receive scholarship on the basis of district-wise quota and backward region quota.
7.9	Scholarship will not be provided if a student do not satisfy the criteria defined for the scholarship-quota. If a scholarship-quota remains vacant (i.e. no one is eligible to receive scholarship on any one of designated quotas), the scholarship will not be transferred to other quotas.
7.10	For Full-Pay category, merit list of students will be published based on their scores secured in the BE entrance examination.
7.11	If two or more students secured similar marks in the BE Entrance Examination and have also other criteria similar, the merit list of these students will be published based on their average score of the subjects Mathematics, Physics and Chemistry in Class 12 or equivalent.
7.12	If any scholarship-quota remain vacant due to no or less number of applicants, or none of the applicants passed the entrance examination, the vacant seat of the scholarship-quota will be added to the list of Full-Pay category.
7.13	If the students from the first admission list do not admit within the specified date and time, they are not considered for admission, and students from the waiting list will be provided an opportunity for admission on the basis of their merit scores.

8.0 Admission Cancellation and Refund of Deposits

A student can apply for the cancellation of his/her admission to the BE programme only within the designated period of admission process as declared by the Dean's Office/Admission Committee. With valid reason, if a student applies for cancellation of his/her admission within the given time period, the coordinator of BE Entrance Examination or head of the School of Engineering may cancel his/her admission, and will call for admission from the waiting list. If

the students' admission is cancelled, s/he will be refunded back upto 50% of total tuition fee deposited during the time of admission. Application for cancelation of admission received after the designated time period will not be considered.

9.0 Entrance Exam Implementation Model

9.1	**Schedule for entrance exam:** Regular (main or first) entrance exam shall be concluded normally within two months from the date of publishing results of grade XII by NEB.
9.2	**Number of questions:** Total number of questions shall be 100
9.3	**Duration of exam:** A minimum duration of entrance exam shall be of 2 hours.
9.4	**Types of questions:** All the questions shall be of multiple-choice question (MCQ).
9.5	**Weightage and distribution of questions:** It shall be as elaborated in the syllabus

10.0   Evaluation and Result Publication Process

10.1	**Weightage of entrance examination for merit list:** The merit list shall be prepared with 100% weightage to score of entrance examination.
10.2	**Threshold to include in merit list**: A minimum threshold to include in the merit list shall be 40%, however, in special circumstances; university may re-visit the threshold after deciding from the decision-making authority of the University.
10.3	**Time-line for publishing results:** Results shall be published within 7 working days after completion of the entrance exam.
10.4	**Medium for publishing results:** Results of the entrance examination shall be published through website of the university and notice board at School of Engineering.

11.0 Framework and Contents for Syllabus

Name of the Course	Weightage	Number of questions	Total marks allocated
Mathematics (M)	40%	40	40 (questions) x 1 (mark) =40
Physics (P)	30%	30	30 (questions) x 1 (mark) =30
Chemistry (C)	20%	20	20 (questions) x 1 (mark) =20
English (E)	10%	10	10 (questions) x 1 (mark) =10
TOTAL	**100%**	**100**	**100**

11.1 Syllabus of Mathematics [40%]

The syllabus is based on requirements for level of understanding of Mathematics for pursuing B.E. degree and largely based on revised syllabus of NEB. It consists of seven (7) chapters, with each chapter consisting of 2-4 sub-chapters, as outlined hereunder.

1	**Set, Logic and Functions**
	1.1 Set, real number system, intervals, absolute value, logic, connectives, laws of logic
	1.2 Function, types of functions – injective, subjective, objective, algebraic,

		trigonometric, exponential and logarithmic; Inverse of function, composite functions
2	**Algebra**	
		2.1 Matrices and determinants, types and properties, inverse of a matrix 2.2 Complex numbers and Polynomial equations 2.3 Sequence and series, Permutation and Combination 2.4 Binomial theorem, exponential and logarithmic series
3	**Trigonometry**	
		3.1 Trigonometric equations and general values 3.2 Inverse trigonometric functions, principal value 3.3 Properties of triangles, in-centre, ortho-centre and circum-centre, solution of triangles
4	**Coordinate Geometry**	
		4.1 Straight lines, pair of lines 4.2 Circles, equations of circle in different forms, tangent and normal 4.3 Conic sections: Parabola, Ellipse and Hyperbola, standard equations and simple properties 4.4 Coordinates in space, Plane and its equation
5	**Calculus**	
		5.1 Limit and continuity of functions, indeterminate forms, L'Hospital's rule 5.2 Derivatives, rules of derivatives, geometrical & physical meanings, higher order derivatives, applications of derivative: tangent and normal, rate of change, maxima and minima 5.3 Integration, rules of integration, standard integrals, definite integral, applications of definite integral: area under a curve and area between two curves 5.4 Differential equations, order and degree, differential equation of first order and first degree: variable separable method, homogeneous, linear and exact differential equations, integrating factor
6	**Vectors and their Products**	
		6.1 Vectors in plane and space, algebra of vectors, linear combination of vectors, linearly dependent and independent set of vectors 6.2 Product of two vectors, scalar and vector product of two vectors, scalar triple product
7	**Statistics and Probability**	
		7.1 Measures of location and measures of dispersion 7.2 Correlation and regression 7.3 Basic terms of probability, conditional and compound probability, additive and multiplicative rules, Bayes' theorem, binomial distribution

11.2 Syllabus of Physics [30%]

The syllabus is based on requirements for level of understanding of Physics for pursuing B.E. degree and largely based on revised syllabus of NEB. It consists of six (6) chapters, with each chapter consisting of 4-7 sub-chapters, as outlined hereunder.

1	**Mechanics**
	1.1 Physical Quantities, Vector and Kinematics: Dimensions, Resolution and Polygon laws of Vector, Vector Algebra, Equations of Motions, Projectile Motion, Relative Motion
	1.2 Newton's Laws of Motion and Friction: Conservation of linear momentum, Applications of Newton's Laws in Equilibrium and Non-equilibrium, laws of Solid Friction and verification
	1.3 Work, Energy and Power: Work-Energy theorem, Kinetic and Potential energy, Conservation of Energy, Conservative and non-conservative forces, Elastic and inelastic collisions
	1.4 Circular motion, Gravitation and SHM: Centripetal force, Conical Pendulum, Banking of Track, Gravitational Potential, variation of g, Motion of satellite, Rocket launch technology, Energy in SHM, Spring -Mass system, simple Pendulum, Damped and Forced oscillation, resonance
	1.5 Rotational Dynamics: Moment of Inertia, Radius of Gyration, Rotational KE, Center of gravity and center of mass, Torque, Conservation of Angular momentum
	1.6 Elasticity: Hook's law, Young modulus, Bulk modulus, modulus of rigidity, Poissons' ratio, elastic energy
	1.7 Fluid Mechanics: buoyancy, flotation, Archimedes' principle, surface tension, capillarity and applications, viscosity, Newton, Stoke and Poiseuille's formula, Reynold number, continuity equation, Bernoulli's equation
2	**Heat and Thermodynamics**
	2.1 Temperature and Quantity of Heat: Thermal Equilibrium, Specific heat, latent heat Method of Mixture, Measurement of specific heat and latent heat, Newton's law of cooling, triple point
	2.2 Thermal expansion: Expansion of Solid & Liquid, Measurement and Applications of expansions
	2.3 Transfer of Heat: Conduction, Convection, Radiation, Thermal Conductivity, Black body radiation, Stefan- Boltzmann law
	2.4 Thermal properties of Matter: Molecular Properties of matter, Kinetic Theory of gases, heat capacities of gases and solids
	2.5 Laws of Thermodynamics: First law, Heat and Work, relation of specific heat of gas, thermodynamics processes, Second law, Heat engine, efficiency, Carnot Cycle, Otto Cycle, Diesel cycle, Refrigerator, Entropy.
3	**Geometric and Physical Optics**
	3.1 Reflection: Plane and Curved Mirror, Mirror Formula
	3.2 Refraction: Plane Surface, Critical Angle, Total Internal Reflection, Lateral shift, Prism, Minimum Deviation, Lenses, Lens Formula, Lens maker's formula, Combination of lenses in contact, Optical Fiber
	3.3 Dispersion: Spectrum, Dispersive Power, Chromatic Aberration, Achromatism, Spherical Aberration, Scattering of light
	3.4 Nature and Propagation of Light: Huygen's principle, Velocity of light
	3.5 Interference: Coherent sources, Young's double slit experiment

	3.6 Diffraction: Fraunhoffer diffraction, Diffraction grating, Resolving power 3.7 Polarization: Brewster's law, Transverse nature of light, Polaroid
4	**Waves and Sound**
	4.1 Wave Motion: Travelling and Stationary wave 4.2 Mechanical Waves: velocity of sound in solid, gas and liquid, effect of temperature, pressure, humidity 4.3 Waves in Pipes and String: closed and Open pipes, Resonance, Resonance Tube, string, laws of vibration of fixed string 4.4 Acoustic Phenomena: Pressure amplitude, intensity level, quality and pitch, Ultrasonic and Infrasonic, Doppler's effect
5	**Electricity and Magnetism**
	5.1 Electrostatics: Coulomb's law, Electric field and Gauss law, Potential and potential gradient, Capacitors, combination of capacitors, types of capacitors, effect of dielectrics, Energy stored by capacitors, polarization and displacement 5.2 DC Circuits: Ohm's law, resistivity and conductivity, work and power, Galvanometer and Ohm meter, internal resistance, Joule's law, Kirchhoff's law and applications 5.3 Thermoelectric Effect: Seebeck effect, Thermocouples, Peltier effect, Thermopile, Thomson effect 5.4 Magnetic effect: Force on a conductor and charge, Torque, Hall's effect, Biot-Savart's law, Ampere's law, Force between parallel conductors 5.5 Magnetic properties of matter: Earth magnetism, magnetic materials, permeability, susceptibility, hysteresis 5.6 Electromagnetic Induction: Faraday's law, Induced emf, AC Generators, Self and mutual induction, energy stored by inductor, transformer 5.7 Alternating Currents: RMS value, Phasor diagram of capacitance, inductance and resistance, Quality factor, Power factor
6	**Modern Physics**

	6.1 Electrons: Millikons's experiment, Cathode rays, specific charge
	6.2 Photons & Quantization of Energy: Photoelectric effect, Plank's constant, Bohr's theory, spectral series, De Broglie theory, Uncertainty principle, X-ray and Bragg's law, Laser
	6.3 Solids & Semiconductor Devices: Intrinsic and extrinsic semiconductors, P-N junction, Rectification, Zener diode, Transistor, Logic gates
	6.4 Radioactivity & Nuclear Reaction: Atomic mass, Isotopes, Nuclear density, Einstein's mass energy relation, mass defect, fission & fusion, law of radioactive disintegration, carbon dating, health hazard
	6.5 Recent Trends in Physics:
	    6.5.1 Particle Physics: Particle and anti-particle, Quarks, Lepton, Baryon, Mesons, Higgs Boson
	    6.5.2 Universe: Big Bang and Hubble's Law, Dark Matter, Gravitational Wave, Black Hole
	    6.5.3 Seismology: Pressure wave, Surface Wave, Internal wave
	    6.5.4 Telecommunication: Radio, TV and Mobile, GPS and Remote sensing

	6.5.5 Environment: Energy Crisis, Environment Pollution, Ozone Layer
	6.5.6 New Technology & Materials: Nano-technology, super conductor & Perfect conductor

11.3 Syllabus of Chemistry [20%]

The syllabus is based on requirements for level of understanding of Chemistry for pursuing B.E. degree and largely based on revised syllabus of NEB. It consists of three (3) chapters, with each chapter consisting of 3-8 sub-chapters, as outlined hereunder.

1	**Physical Chemistry**
	1.1 Chemical Arithmetic: Dalton's atomic theory and Laws of Stoichiometry, Atomic mass and Molecular mass, Empirical molecular formula and limiting Reactants, Avogadro are Hypothesis and its applications and Equivalent masses. 1.2 State of Matter: Gaseous state, liquid and solid states. 1.3 Atomic Structure and Periodic Classification of Elements: 1.4 Oxidation, Reduction and Equilibrium 1.5 Volumetric Analysis, 1.6 Ionic Equilibrium, Acid, Base and Salt 1.7 Electrochemistry 1.8 Energetic of Chemical Reaction, Chemical Kinetics, Chemical Bonding and Shape of Molecules
2	**Inorganic Chemistry**
	2.1 Non-metal: Hydrogen, Oxygen, Ozone, Water, Nitrogen and its compounds, Halogen, Carbon, Phosphorous, sulphur, Noble gas and Environment pollution. 2.2 Metals: Metallurgical Principle, Alkali metal, Alkaline Earth metals, Coinage metals: Copper, Silver, Gold 2.3 Extraction of Metal: Zinc and Mercury, Iron Compound
3	**Organic Chemistry**
	3.1 Introduction: Fundamental principles, Purification of organic compounds, Nomenclature of Organic compounds, Structure isomerism and idea of reaction mechanism 3.2 Hydrocarbons: Alkanes, Alkenes and Alkynes, Aromatic hydrocarbons 3.3 Haloalkanes and Haloarenes 3.4 Alcohols, Phenols and Ethers 3.5 Aldehydes, Ketones, Carboxylic Acid and Derivatives, Aliphatic and Aromatic 3.6 Nitro Compounds and Amines: Aromatic and Aliphatic

11.4 Syllabus of English [10%]

The English proficiency test for entrance in engineering is based on general English and it is designed to measure students' abilities to communicate in English. It consists of five (5) chapters, with each chapter consisting of 4-8 sub-chapters, as outlined hereunder.

1	**Vocabulary**
	1.1 Synonyms and antonyms 1.2 Homonyms, homophones 1.3 Word building, suffixes and prefixes 1.4 Meaning of words in context 1.5 Idioms and phrases
2	**Grammar**
	2.1 Articles and possessives 2.2 Pronouns, prepositions, adjectives, adverbs 2.3 Tenses, modals, conditions 2.4 Subject verb agreement 2.5 Tag questions 2.6 Sentence types and transformations 2.7 Voice 2.8 Direct and indirect narration
3	**Reading Comprehension**
	3.1 Contents/ideas 3.2 Reading between the lines 3.3 Contextual clues 3.4 Reconstruction (rewording)
4	**Writing**
	4.1 Punctuations 4.2 Cohesive devices 4.3 Coherence 4.4 Discourse markers
5	**Sounds of English**
	5.1 Phonemes 5.2 Phonemics symbols 5.3 Word stress 5.4 Intonation