



Guidelines for Harmonizing B.E./B. Arch. Entrance Examination
Date of Approval from the UGC: Jestha 18, 2079 (1st June, 2022)

**Guidelines for
Harmonizing B.E./B. Arch. Entrance Examination Across Universities in
Nepal, 2079**



University Grants Commission (UGC)

Sanothimi, Bhaktapur, Nepal

Jestha, 2079 (June, 2022)

1. PREAMBLE

University Grants Commission (UGC), an apex institution of higher education in Nepal is mandated for i) designing funding policies and disbursing funds to higher education institutions and academicians there in, ii) carrying out activities for maintaining and improving quality standards in higher education, iii) facilitating national higher education policy development of the government of Nepal and its implementation, and iv) advising the government of Nepal for the establishment of new universities. In addition, it also implements scholarship programs of various categories to graduate students.

Higher education is one of the priority areas of the government of Nepal. The National Education Policy 2076 (2019) has emphasized on prioritizing technical education, quality improvement and expanding access to disadvantaged groups and areas. Engineering education is one of the priority areas of technical education to which UGC has supported universities for human resource development. Currently, seven Universities in Nepal are providing engineering education with their own curriculum including admission standards and timetable. Taking this situation into consideration, the Government of Nepal realizes the need for streamlining and harmonizing the engineering education across the country so as to maintain minimum standards for entry, teaching learning methods, evaluation systems and learning outcomes. The minimum standards are also necessary for issuing no objection letter (NOL) to those going abroad for similar degrees.

Considering the context above and taking into consideration of University Grants Commission Act 2050 clause 6.1 (gha, ng., cha), the UGC Nepal issues a framework for undergraduate as ***Guidelines for Harmonizing B.E./B.Arch. Entrance Examination Across Universities in Nepal, 2079.***

2. NAME AND EFFECTIVE DATE

- 2.1 This guideline is referred to as “***Guidelines for Harmonizing B.E./B.Arch. Entrance Examination 2079***” for brevity.
- 2.2 This guideline will be effective from the date of approval from the UGC Board.



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3. FRAMEWORK FOR HARMONIZING B.E./B.ARCH. ENTRANCE EXAMINATION

Overall program framework for engineering education in higher education in Nepal shall be interdisciplinary. B.E./B.Arch. entrance examinations across all the universities shall follow a framework consisting of 5 components and 24 indicators, as shown in **Table 3.1**. Initially, each university shall implement entrance exam separately, following this framework, with the aim of moving towards Joint Entrance Examination for all the universities. This framework shall be reviewed at least in every five years and shall be refined as necessary.

Table 3.1 Harmonization framework for B.E./B.Arch. entrance exam across universities in Nepal

Components	Indicators	Recommendations
1. Entry requirements	• Requirements for grade/score in SLC (class 12) examination of National Examination Board (NEB) or equivalent	• At least one course on Physics (P), Chemistry (C) and Mathematics (M) with a minimum of 45% or CGPA of 2 (in a scale of 4) and at least Grade C (A-level: Grade D) in P, C & M.
	• Requirements for Mathematics in NEB or equivalent	• At least 100 marks mathematics in SLC (class 12) examination of NEB or equivalent level
2. Syllabus structure and contents	• Weightage in Mathematics (M), Physics (P), Chemistry (C), & English (E)	• Mathematics 40%, Physics 30%, Chemistry 20% and English 10%
	• Syllabus contents	• As elaborated in Chapter 4
	• Provision for additional examinations	• Universities may add other courses too as required (e.g., aptitude test for Architecture, biology for biomedical, etc.), with addition of more time.
3. Application submission procedure	• Publication of entrance notice	• At least 35 days ahead of entrance date/schedule
	• Mode of application submission	• Online
	• Application processing fee	• NRs. 1,500 – 2,500, with provision for 10% increase per year
	• Application submission pack	• Documents to be submitted as elaborated in Section 3.3.4
4. Entrance exam implementation method	• Schedule of entrance examination	• Within two months from the date of publication of Grade XII results by NEB
	• Entrance Examination Committee/Board	• 3-7 member committee/ board to be formed to implement the entrance examination.
	• Mode of entrance examination	• Computer Based Test (CBT), shall be implemented fully within 3-years. One-time grant for digital & physical infrastructure expected



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	• Number of questions	• 100
	• Duration of exam	• 2 hours
	• Types of questions	• Multiple choice Questions (MCQ)
	• Weightage and distribution of questions	• University/Institutions shall decide
	• Admission booklet	• Contents to be coherent for all the universities, as outlined in Appendix-A1 .
	• Provision for re-entrance examination	• University/institutions shall decide as per need
	• Provision for international students	• University/institutions shall decide the model to allow foreign students for the entrance examination.
	• Provision for model question	• To be included/appended in admission booklet
5. Evaluation and result publication process	• Weightage of entrance exam for merit list	• 100%
	• Threshold to include in merit list	• 40%
	• Time-line for publishing result	• Within 7 working days
	• Medium for publishing result	• Online (digital) and notice board (physical)

Recommendations for each indicator are elaborated hereunder.

3.1 Entry Requirements

3.1.1 Requirements for score in NEB exam or equivalent

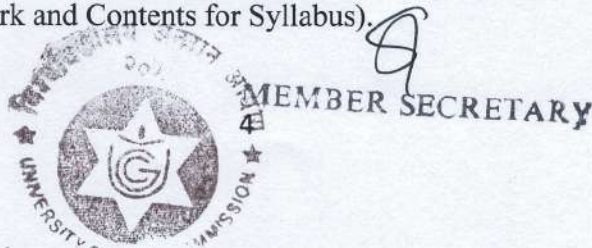
- Candidates should have studied at least one course on Mathematics, Physics and Chemistry and completed SLC (class 12) examination of NEB or equivalent level from a recognized academic institution.
- Candidates should have scored a minimum of 45% or CGPA of 2 (in a scale of 4) and at least Grade C (in 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) does not apply for extra courses, if any.

3.1.2 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.

3.2 Syllabus Structure and Contents

3.2.1 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.

3.2.2 Syllabus contents: The contents of syllabus for P, C, M and E shall be as elaborated in section 4 (Framework and Contents for Syllabus).



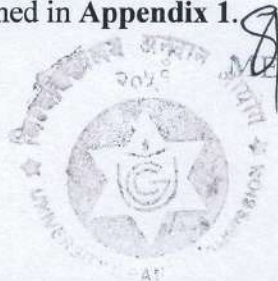
- 3.2.3 Provision for additional exams: Each university, depending upon type of program, may include additional courses for entrance exams (e.g., Aptitude test for Architecture; Biology for biomedical engineering, etc.), with provision of additional time. In that case, syllabus structure/contents as well as additional weightage for those courses shall be decided by respective universities.

3.3 Application Submission Procedure

- 3.3.1 Publication of entrance notice: The entrance notice shall be published at least 35 days ahead of the entrance schedule/date.
- 3.3.2 Mode of application submission: The application shall be submitted Online.
- 3.3.3 Application processing fee: Application processing fee shall be in a range of NRs. 1,500 – 2,500. Universities may increase application fee by up to 10% per year.
- 3.3.4 Application submission pack: The application submission pack shall include;
- Citizenship certificate in case of Nepali citizen and copy of passport and/or national identity document in case of foreign students
 - Original certificates (transcript/mark sheet/grade sheet, certificate and character certificate) of SEE (or equivalent) and SLC (class 12) examination of NEB (or equivalent classes).
 - Equivalence certificate for those who passed exam from other than NEB/CTEVT.
 - Students waiting for results may also apply provisionally, but they are required to submit all/complete documents at the time of admission.

3.4 Entrance Exam Implementation Method

- 3.4.1 **Schedule for entrance examination:** Regular (main or first) entrance exam of all the universities in Nepal shall be concluded within two months from the date of publishing results of grade XII by NEB.
- 3.4.2 **Admission committee:** An Admission Committee (or Entrance Examination Committee) headed by Dean or Assoc./Deputy/Asst. Dean or a Prof./Assoc. Prof. and consisting of 3-7 members shall be formed to implement the BE/B.Arch. entrance examination.
- 3.4.3 **Mode of entrance examination:** All universities/institutions shall move gradually towards computer-based test (CBT) and shall be implemented fully within 3-years. One-time grant from UGC is expected as and when required, to support implementation of CBT.
- 3.4.4 **Number of questions:** Total number of questions shall be 100.
- 3.4.5 **Duration of exam:** A minimum duration of entrance exam shall be of 2 hours.
- 3.4.6 **Types of questions:** All the questions shall be of multiple-choice question (MCQ).
- 3.4.7 **Weightage and distribution of questions:** It shall be as elaborated in section 4 (Framework and Contents for Syllabus). A question bank shall be prepared and updated periodically for smooth implementation of the entrance examination.
- 3.4.8 **Admission booklet:** Each university/institution shall publish and distribute admission booklet along with admission notice. The admission booklet shall have contents as outlined in Appendix 1.



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- 3.4.9 **Provision for re-entrance examination:** The respective University shall decide on requirements for re-entrance examination.
- 3.4.10 **Provision for the international students:** University/institutions shall decide appropriate model to allow foreign students for the entrance examination.
- 3.4.11 **Provision for model question:** Model questions shall be developed by the university and shared as Appendix of Admission Booklet.

3.5 Evaluation and Results Publication Process

- 3.5.1 Weightage of entrance examination for merit list: The merit list shall be prepared with 100% weightage to score of entrance examination.
- 3.5.2 Threshold to include in merit list: A minimum threshold to include in the merit list shall be 40%, however, in special circumstances, universities/institutions may re-visit the threshold after deciding from the decision-making authority of the University/Institutions.
- 3.5.3 Time-line for publishing results: Results shall be published within 7 working days after completion of the entrance examination.
- 3.5.4 Medium for publishing results: Results of the entrance examination shall be published through website of the respective universities/institutions and notice board of the respective university/institutions.



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4. FRAMEWORK AND CONTENTS FOR SYLLABUS

4.1 Syllabus of Mathematics [40%]

The syllabus shall be based on requirements for level of understanding of Mathematics for pursuing B.E./B.Arch. 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. Each university may decide on distribution of weightage across each chapter/sub-chapter.

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, linear properties, 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



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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

4.2 Syllabus of Physics [30%]

The syllabus shall be based on requirements for level of understanding of Physics for pursuing B.E./B.Arch. degree and largely based on the syllabus of NEB. It consists of six (6) chapters, with each chapter consisting of 4-7 sub-chapters, as outlined hereunder. Each university may decide on distribution of weightage across each chapter/sub-chapter.

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



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- 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: Fraunhofer 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 & 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

4.3 Syllabus of Chemistry [20%]

The syllabus is based on requirements for level of understanding of Chemistry for pursuing B.E./B.Arch. degree and largely based on the syllabus of NEB. It consists of three (3) chapters, with each chapter consisting of 3-8 sub-chapters, as outlined hereunder. Each university may decide on distribution of weightage across each chapter/sub-chapter.

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

4.4 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 four (4) chapters, with each chapter consisting of 4-8 sub-chapters, as outlined hereunder. Each university may decide on distribution of weightage across each chapter/sub-chapter.

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

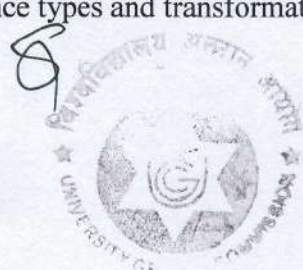
2.3 Tenses, modals, conditions

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



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5. CRITERIA FOR NO OBJECTION LETTER

The Government of Nepal is concerned that quality of enrollment affects quality of engineering graduates and therefore will have impact on professional practice. As engineers graduating from abroad should also get license from Nepal Engineering Council (NEC) for practicing engineering profession in Nepal, a quality control mechanism is required for those who wish to study abroad. Considering this in mind, Ministry of Education shall adopt following provisions while issuing **No Objection Letter (NOL)** to pursue B.E./B.Arch. education outside Nepal.

- The candidates willing to study engineering education outside Nepal shall pass entrance exam of any university/institutions in Nepal, which offers engineering program, following this guideline. Institutions shall refer to respective dean offices for **NOL** purpose.
- Each university/institution shall send a certificated merit list to Nepal Engineering Council (NEC) within seven (7) days from the date of publishing the merit list.
- Ministry of Education, Science and Technology shall issue **NOL** based **only** on the merit list of B.E./B.Arch. entrance examination upon recommendation from the NEC.
- The merit list (including that of re-entrance examinations, if any) shall be valid until the next regular merit list is published.
- In case of the candidates who are already enrolled in the B.E./B.Arch. program in one of the universities in Nepal and would like to go abroad by dropping the admission with Nepalese university, the candidate should also submit a **consent letter** from the respective university/institution while applying for the **NOL**.



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APPENDIX 1

MINIMUM CONTENTS FOR ADMISSION BOOKLET

The admission booklet shall have at least the following contents.

1. Introduction of University

- Brief history, faculties, campus, programs (all level)

2. Engineering Programs Offered in University

- Affiliated and constituent campuses; programs offered; intake capacity

3. Admission Procedure of B.E./B.Arch. Programs

- As elaborated in this guideline – entry requirements, application submission procedure, syllabus; entrance exam implementation method, evaluation and result publication process

4. Selection Criteria and Merit List Publication

- Criteria for merit list; considerations in case of equal score; merit list category (if any); additional documents required for reserved quota (if any).

5. Reserved Quota

- Details on various types of reserved quota and/or scholarship scheme

6. Documents Requirements for Admission

- Original citizenship certificate in case of Nepali citizen and copy of passport and/or national identity document in case of foreign students
- Original certificates (transcript/certificate and character) of SEE (or equivalent) and 12 (or equivalent) classes.
- Equivalent certificate for those who passed exam other than NEB/CTEVT or outside Nepal.

7. Admission Cancellation and Refund

- Conditions for admission cancellation and refund

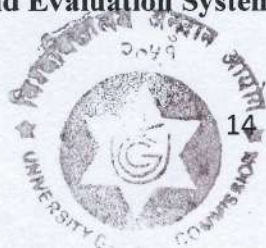
8. Fee Structure


- Fee Structure for each program with appropriate breakdown, for both constituent and affiliated campus

9. Registration and Identity/Library Cards

- Details of registration procedure, issuing identity cards, library membership/cards, etc.

10. Academic Calendar and Evaluation System




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- Academic calendar with details of start and end date of semester ensuring completion within normal duration of respective programs; criteria/details on internal/final exams, frequency of exam, attendance requirements, etc.

11. Semester-Specific Scholarship and Medals/Awards

- Criteria and provisions for semester-specific scholarship, provisions for medals/awards, etc.

12. Code of Conduct of Students

- Detailing of code of conduct, action against non-compliance of code of conduct format for self-declaration from students as well as parents.



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