

**Mid-West University
Graduate School of Education
Surkhet, Nepal**



**B.Ed. in Mathematics Education
First Semester Curriculum
2025**

B.Ed. in Mathematics Education

First Semester

1. English Grammar and Comprehension (COM411)	C.H. – 3
2. Aniwarya Nepali I (COM412)	C.H. – 3
3. Foundation of Education (EDU413)	C.H. – 3
4. Applied Mathematics (MATH414)	C.H. – 3
5. Vector Analysis (MATH415)	C.H. - 3

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Course Title: English Grammar and Comprehension
 Level: B.Ed.
 Semester: First

Course code: COM411
 Nature of Course: Theoretical
 Credit Hours: 3

1. Course Description

This course aims to develop foundational skills in English grammar, vocabulary, reading, and writing for undergraduate education students. It offers both theoretical knowledge and practical application of grammatical rules, sentence structures, and vocabulary, allowing students to create clear and meaningful communication in academic and professional settings. The course also boosts learners' comprehension abilities through the critical reading of various literary and informational texts. Additionally, it improves their writing skills for different purposes, such as essays, letters, and reports. This program aligns with the broader B.Ed. objectives, which focus on equipping future educators with strong language skills and effective communication—essential for classroom teaching and academic achievement.

2. Competencies

Upon completion of this course, students will be able to:

- **Comp 1:** Identify and explain fundamental grammatical structures, vocabulary forms, and conventions of English writing.
- **Comp 2:** Apply grammatical rules, vocabulary, and reading strategies to construct coherent sentences, paragraphs, and interpret texts with critical awareness.
- **Comp 3:** Evaluate the accuracy and effectiveness of language use in written and spoken forms, and create academic and professional texts demonstrating grammatical precision and communicative clarity.

3. Course Content

Unit/Content/Teaching Hours	Specific Learning Outcomes	Detailed contents/Depth of content
Unit 1: Basic English Grammar (16 Hrs.)	1. Identify and explain the fundamental sentence structures. 2. Apply and construct grammatically correct sentences, dialogues, and short texts using appropriate English grammar. 3. Analyze and evaluate grammatical features in written and spoken texts, detecting common errors in English. 4. Compose and create coherent academic, creative, and professional writing in English.	1.1 Introduction to English Grammar 1.2 Reasons for Learning English Grammar 1.3 Use of English Grammar 1.3.1 Use of Article 1.3.2 Use of Preposition 1.3.3 Use of Conjunction 1.3.4 Tense 1.3.5 Conditional Sentence 1.3.6 Subject-Verb Agreement 1.3.7 Clause 1.3.8 Causative Verbs 1.3.9 Voice 1.3.10 Reported Speech 1.3.11 Transformations
Unit 2: Basic English Vocabulary (10 Hrs)	1. Distinguish literal, figurative, and contextual meanings of words, and recognize various vocabulary forms such as synonyms, antonyms, homonyms, hyponyms, and homophones in spoken and written texts. 2. Apply and construct appropriate vocabulary by using single words for expressions, phrasal verbs, idioms, and derivatives in sentences, dialogues, and short texts.	2.1 Meaning of the Words 2.1.1 Literal meaning 2.1.2 Figurative meaning 2.1.3 Contextual meaning 2.2 Single Word for Expressions 2.3 Synonyms 2.4 Antonyms 2.5 Phrasal Verbs 2.6 Idioms 2.7 Derivatives 2.8 Homonyms 2.9 Hyponyms 2.10 Homophones

	3. Compose and create coherent academic, creative, and professional writing pieces by integrating the vocabulary items in English.	
Unit 3: Reading Comprehension (10 Hrs.)		3.4 Reading Actively (Previewing and Annotating) 3.5 Nancy Mairs Disability (Annotated Essay) 3.6 Developing an Understanding (Summarizing and Thinking Critically) 3.7 Analyzing Written Works (Meaning, Writing Strategies and Language) 3.8 Examining Visual Images (Seeing the Big Picture and Taking a Critical Look) 3.9 Reading for Pleasure 3.9.1 Solitary Reaper William Wordsworth 3.9.2 A Poison Tree William Blake 3.9.3 The road not Taken (Poem) Robert Frost 3.9.4 'Baisakh' (Poetry) Madhav Prasad Ghimire 3.9.5 'Chasing Dreams' (Poetry) Abhi Subedi 3.9.6 'Teacher' (Short Story) - Vishnu S. Rai 3.9.7 Reminiscing of Childhood Days (Essay) – Govind Raj Bhattarai
Unit 4: Basic Writing in English		4.1 Basic Use of Punctuation in English 4.1.1 Capitalization 4.1.2 Full Stops 4.1.3 Comma 4.1.4 Colons 4.1.5 Semi-Colons 4.1.6 Question Marks 4.1.7 Apostrophes 4.1.8 Hyphens 4.2 Basic Writings in English 4.2.1 Paragraph Writing 4.2.2 Letter Writing 4.2.3 Email Writing 4.2.4 Essay Writing 4.2.5 CV Writing 4.2.6 Job Application Writing 4.2.7 Report Writing

4. Teaching Learning Strategies

- **Communicative Language Teaching (CLT):** Encourages interaction through real-life communication tasks (e.g., dialogues, interviews, classroom debates).
- **Task-Based Learning (TBL):** Students complete meaningful tasks such as writing a short story, summarizing a poem, or drafting a job application.

- **Blended Learning Approach:** Integration of digital platforms (YouTube, Grammarly, BBC Learning English, Kahoot) for grammar and vocabulary practice.
- **Reflective Learning:** Learners maintain personal reflection logs to record their grammatical progress and reading comprehension development.
- **Collaborative and Cooperative Learning:** Pair/group work, peer assessment, and collaborative projects promote teamwork and communication.
- **Differentiated Instruction:** Activities are designed for varied proficiency levels—extra grammar drills for weaker learners and creative writing tasks for advanced ones.
- **Problem-Based Learning (PBL):** Students identify honest communication or writing issues and find grammatical or stylistic solutions.

5. Assessment and Evaluation

The assessment and evaluation system for this course is designed to promote continuous learning, active participation, and academic integrity. It integrates both internal (40%) and external (60%) components to ensure a balanced measurement of students' knowledge, skills, and performance. The internal evaluation emphasizes students' regularity, discipline, engagement in classroom activities, and consistent academic progress through unit tests, assignments, project work, and presentations.

Internal Evaluation Scheme (40%)

Evaluation Component	Weightage
Attendance & Discipline	10%
Mid-Term	10%
Assignments /Project Work	10%
Presentation	10%

External Evaluation – 60%

Nature of questions	Total questions to be asked	Number of questions to be answered	Weightage
Multiple choice items	10	10 marks	10 Marks
Short answer questions	6 with 2 'or' questions	6 x 5 marks	30 Marks
Long answer questions	2 with 1 'or' question	2 x 10 marks	20 Marks

6.

7. References

- Alam, S. (2024). *Exploring English phrasal verbs: Navigating the versatility of phrasal verbs*. Saiful Alam (Unit 2)
- Bailey, S. (2014). *Academic writing: A handbook for international students*. Routledge. (Unit 4)
- Huddleston, R., Pullum, G. K., & Reynolds, B. (2022). *A student's introduction to English grammar*. Cambridge University Press. (Unit 1)
- Kennedy, L. et al. (2020). *The Bedford Reader (14th eds.)*. Bedford/St. Martin's. (Unit 3)
- Ordway, E. B. (2024). *Synonyms and Antonyms: An Alphabetical List of Words in Common Use, Grouped with Others of Similar and Opposite Meaning*. Sully and Kleinteich. (Unit 2)
- Osmond, A. (2024). *Academic writing and grammar for students*. (Units 1 and 4)
- Rai, V.S. (2016), *Martyr and other stories*. Oriental Publication.
- Stewart, L. K. (2025). *English grammar*. American Book Company (Unit 1)
- The Royal Nepal Academy. (2005). *Nepalese Literature*. Royal Nepal Academy
- Xavier, C., & Chia, A. (2025). *Teaching English grammar in Asian contexts: Making meaning with grammar*. Taylor & Francis. (Unit 1)

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पाठ्यांश शीर्षक : अनिवार्य नेपाली- १
तह : वि. एड.
सत्र : पहिला

पाठ्यांश सङ्ख्या : नेपा ४१२
पाठ्यांश प्रकृति : सैद्धान्तिक/प्रायोगिक
क्रे.आ. : ३

यो पाठ्यक्रम मध्यपश्चिमाञ्चल विश्वविद्यालय, ग्याजुएट स्कुल अफ एजुकेशन अन्तर्गत चार बर्से सेमेस्टर प्रणालीमा आधारित स्नातक (ब्याचलर्स इन एजुकेशन) मा अध्ययन गर्ने विद्यार्थीहरूलाई नेपाली भाषामा विशिष्ट बोध, अभिव्यक्ति र रचना कौशलको विकास गर्न तयार पारिएको हो । यस पाठ्यक्रममा शब्दभण्डार, वाक्यतत्त्वपरक रचना, नेपाली वाङ्मयका विभिन्न क्षेत्रका गद्यांशको पठनबोध, सूचनाको रूपान्तर, बुँदाटिपोट, व्यावहारिक लेखन तथा निबन्ध लेखनका साथै निर्धारित साहित्यिक कृतिहरूको पठन, आस्वादन र अभिव्यक्ति क्षमताको विकास गर्ने पाठ्यसामग्रीहरू समावेश गरिएका छन् ।

२. साधारण उद्देश्य

- नेपाली वाङ्मयका विविध क्षेत्रमा प्रयुक्त शब्दहरूको स्रोत, वर्ग र वनोट पहिचान गरी वाक्यमा तिनको शुद्ध रूपको सन्दर्भपूर्ण प्रयोग गर्ने,
- नेपाली वाक्यतत्त्वको स्वरूप पहिचान गरी निर्देशित रचना (वाक्यान्तरण) र वाक्यसंश्लेषण गर्ने,
- वाङ्मयका विविध क्षेत्रका गद्यांशहरू पढी तिनमा आधारित बोधप्रश्नहरूको उत्तर दिने,
- तालिका, चित्राकृति (डायग्राम) को सूचनालाई अनुच्छेदमा रूपान्तर गर्न तथा अनुच्छेदमा रहेका सूचनालाई तालिका र चित्राकृतिमा रूपान्तर गर्ने,
- सम्बद्ध गद्यांशको बुँदा टिपोट गर्ने र बुँदाका आधारमा अनुच्छेदको रचना गर्ने,
- पाठ वा पाठांशका विषयवस्तुमा आधारित भई निर्देशित अनुच्छेद रचना गर्ने,
- निर्धारित ढाँचामा आधारित भई व्यावहारिक लेखन तयार गर्ने,
- विभिन्न विषयमा आत्मपरक तथा वस्तुपरक निबन्ध लेख्ने,
- निर्धारित कविता, गीत, गजल, निबन्ध, कथा तथा एकाङ्की/नाटक रचनाको अध्ययन तथा तिनको आस्वादन र प्रतिक्रियात्मक अभिव्यक्ति दिने ।

विशिष्ट उद्देश्य	पाठ्यविषय
<ul style="list-style-type: none"> ● नेपालीका विभिन्न स्रोतका शब्दको पहिचान गर्न, ● नेपालीका विभिन्न शब्दवर्गबारे परिचित हुन, ● शब्दवर्ग छुट्टयाई शब्दको वनोट देखाउन । ● वर्णविन्यासको सही प्रयोग गर्न ● निर्देशित रचना तयार गर्न 	<p>एकाइ एक : शब्द, शब्दनिर्माण र वाक्यतत्त्वपरक रचना (१० घण्टा)</p> <p>१.१ शब्दस्रोत १.२ शब्दवर्ग १.३ शब्दवनोट १.४ वर्णविन्यास १.५ निर्देशित रचना (वाक्यान्तरण : लिङ्ग, पुरुष, काल, पक्ष)</p>
<ul style="list-style-type: none"> ● नेपाली वाङ्मयका विभिन्न क्षेत्रसँग सम्बन्धित दृष्टांश र अदृष्टांश पाठ/पाठांशबाट सामान्य बोधात्मक प्रश्नको उत्तर दिन । 	<p>एकाइ दुई : पठनबोध (५ घण्टा)</p> <p>नेपाली वाङ्मयका शिक्षा, अर्थव्यवस्था, भूगोल तथा ऊर्जा, वातावरण तथा जैविक विविधता, विज्ञान तथा प्रविधि सम्बन्धी दृष्टांश र अदृष्टांश पाठ वा पाठांशमा आधारित अनुमानात्मक, निष्कर्षात्मक, तथ्यात्मक तथा समीक्षात्मक प्रकृतिका प्रतिक्रियामूलक सामान्य बोध प्रश्नहरूको अभ्यास ।</p>
<ul style="list-style-type: none"> ● तालिका र चित्राकृति (डायग्राम) को सूचनालाई अनुच्छेदमा र अनुच्छेदमा रहेका सूचनालाई तालिका र चित्राकृति (डायग्राम) मा रूपान्तर गर्न । 	<p>एकाइ तीन : सामान्य सूचनाको रूपान्तर (६ घण्टा)</p> <p>३.१ तालिकाको अनुच्छेदमा रूपान्तर ३.२ सूचनाको तालिकीकरण ३.३ चित्राकृति (वृत्ताकार र स्तम्भ) को अनुच्छेदमा रूपान्तर ३.४ अनुच्छेदका सूचनाको चित्राकृति (वृत्ताकार र स्तम्भ) मा रूपान्तर</p>
<ul style="list-style-type: none"> ● विभिन्न अनुच्छेदबाट बुँदा टिपोट गर्न । ● बुँदाका आधारमा अनुच्छेदको रचना गर्न । ● विभिन्न प्रकृतिका निर्देशित अनुच्छेद रचना गर्न । 	<p>एकाइ चार : बुँदा टिपोट र अनुच्छेद रचना (५ घण्टा)</p> <p>४.१ अनुच्छेदबाट बुँदा टिपोट ४.२ बुँदाका आधारमा अनुच्छेदको रचना ४.३ निर्देशित अनुच्छेद लेखन</p>

<ul style="list-style-type: none"> ● विज्ञापन, शुभकामना, बधाई ज्ञापन, व्यक्तिवृत्त र प्रतिवेदनका नमुना तयार गर्न ● विभिन्न विषयसँग सम्बद्ध आत्मपरक र वस्तुपरक निबन्ध सिर्जना गर्न । 	<p>एकाइ पाँच : व्यावहारिक र निबन्ध लेखन (८ घण्टा)</p> <p>५.१ व्यावहारिक</p> <p>५.१.१ विज्ञापन लेखन ५.१.२ शुभकामना, बधाई ज्ञापन</p> <p>५.१.३ व्यक्तिवृत्त लेखन ५.१.४ प्रतिवेदन लेखन</p> <p>५.२ निबन्ध लेखन</p> <p>५.२.१ आत्मपरक र वस्तुपरक, निबन्ध सिर्जना</p>
<ul style="list-style-type: none"> ● कविता, गीत, गजल, निबन्ध, कथा र नाटकको सरसर्ती अध्ययन गरी तिनको आस्वादन गर्न । 	<p>एकाइ छ : साहित्यिक कृतिको अध्ययन (१४ घण्टा)</p> <p>६.१ कविता/गीत/गजल (४ घण्टा)</p> <p>६.१.१ माधव घिमिरे : सगरमाथा महान हेर</p> <p>६.१.२ विमल निभा : टोल</p> <p>६.१.३ अमर गिरी : साधारण सपना</p> <p>६.२ नेपाली निबन्ध (३ घण्टा)</p> <p>६.२.१ लक्ष्मीप्रसाद देवकोटा : भलादमी</p> <p>६.२.२ राजेन्द्र सुवेदी : खाली बोटल</p> <p>६.३ नेपाली कथा (४ घण्टा)</p> <p>६.३.१ भवानी भिक्षु : सावित्रीको बाखो</p> <p>६.३.२ भूमक घिमिरे : पर्दा, समय र मान्छेहरू</p> <p>६.३.३ महेश विक्रम शाह : गाउँमा गीतहरू गुन्जिँदैनन्</p> <p>६.४ नेपाली नाटक (३ घण्टा)</p> <p>६.४.१ विजय मल्ल : मानिस र मुखुण्डो</p>

४. शिक्षण प्रक्रिया

प्रत्येक पाठ्य एकाइमा पाठ्यवस्तुको प्रकृति र आवश्यकता अनुसार व्याख्यान, प्रश्नोत्तर, छलफल, उदाहरण, प्रदर्शन, गृहकार्य, सामूहिक कार्य, अभ्यास र प्रस्तुतीकरण विधिहरूको उपयोग गरिनेछ। व्याख्यान विधिलाई कमभन्दा कम उपयोग गरी विद्यार्थी सहभागितामूलक शिक्षण कार्यकलापहरूलाई बढी महत्त्व दिइनेछ। यसै गरी पाठ्यपुस्तक, सन्दर्भपुस्तक, पाठपत्र, आरेख, तालिका, सूची आदि समेतको उपयोग गरेर योजनाबद्ध शिक्षण गर्नमा जोड दिइने छ।

५. मूल्याङ्कन प्रक्रिया

मूल्याङ्कन दुई प्रकारले गरिनेछ : (१) आन्तरिक मूल्याङ्कन, यसका निम्ति ४० प्रतिशत अङ्क निर्धारण गरिएको छ, (२) बाह्य मूल्याङ्कन, यसका निम्ति ६० प्रतिशत अङ्क निर्धारण गरिएको छ। आन्तरिक मूल्याङ्कन कक्षा शिक्षण सँगसँगै गरिनेछ र बाह्य मूल्याङ्कन सेमेस्टरका अन्त्यमा विश्वविद्यालय परीक्षा प्रणालीले निर्धारण गरेअनुसार हुनेछ। यसका लागि निम्नानुसारको प्रश्नयोजना रहनेछ :

आन्तरिक मूल्याङ्कन (४० प्रतिशत)

कार्य	अङ्क
हाजिरी उपस्थिति	५%
गृहकार्य (पटकपटक)	१०%
कक्षा प्रस्तुतीकरण	१०%
परियोजना कार्य	५%
लिखित परीक्षा	१०%

१० अङ्क शिक्षकले कक्षा कार्यकलापभित्र लिखित, मौखिक, प्रयोगात्मक, गृहकार्य, कक्षाकार्य वा परियोजना कार्यका रूपमा सञ्चालन गर्न सक्नेछन्।

बाह्य परीक्षा (६० प्रतिशत)

वस्तुगत प्रश्न	७×१=७	७ वटा प्रश्न	वस्तुगत प्रश्न : समग्र पाठयांशबाट
बोधात्मक प्रश्न	४×२=८	४ वटा प्रश्न	बोधात्मक प्रश्न : पठनबोधबाट र
सङ्क्षिप्त उत्तरात्मक प्रश्न	५×५=२५	२ विकल्पसहित ६ वटा प्रश्न	सङ्क्षिप्त उत्तरात्मक प्रश्न : समग्र पाठबाट
विवेचनात्मक प्रश्न	२×१०=२०	१ विकल्पसहित ३ वटा प्रश्न	विवेचनात्मक प्रश्न : साहित्यिक पाठ र निबन्ध लेखनबाट

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Mid-West University
Graduate School of Education
B.Ed. in Mathematics Education

Course Title: Foundation of Education
 Level: B.Ed.
 Semester: First

Course code: EDU413
 Nature of Course: Theoretical
 Credit Hours: 3

1. Course Description

This course is a core course designed for the students of Bachelor in Education .The course categorized into two parts. The first part of this course is philosophical-foundation which deals with the concept and fields of philosophy and importance of philosophy in education. Along with this philosophical part also incorporates basic and educational philosophies with their concept, major principles and educational implication. The second part of this course is sociological foundation which attempts to develop sociology of education and their implication in education. Similarly, this part also deals with concept of socialization, different agencies and modes of socialization. And education for national integration .Thus the overall focus of this course is to inform students about how the philosophy and society is the foundations of education.

2. Competencies

Upon completion of this course, students will be able to:

1. Introduce the concept and the fields of philosophy in brief.
2. Explain the relationship between philosophy and education.
3. Introduce the western educational philosophies and its educational methods in education.
4. Apply the educational implications of educational philosophies.
5. Clarify the concept of religious philosophy in education
6. Discuss role of religious philosophy in curriculum development
7. Illuminate the meaning and importance of socialization
8. State the different agencies of socialization
9. Explain the modes of socialization and their impact in education
10. Describe the meaning of national integration and its importance in education
11. Elaborate the measures and obstacles of national integration.

3. Course Content

Unit/Content/Teaching Hours	Learning Outcomes	Detailed contents/Depth of content
Unit 1: Introduction to Philosophy (7 Hrs) 1.1 concept of philosophy 1.2 Fields of philosophy 1.3 Relationship between philosophy and education.	-Explain concept and fields of philosophy. -Show the relationship between philosophy and education.	1.1. concept of philosophy 1.2 Fields of philosophy - Ontology - Epistemology - Axiology 1.3 Relationship between philosophy and education.
Unit 2: Introduction to Western Educational Philosophies (16 Hrs) 2.1- Idealism in education 2.2- Naturalism in education 2.3- Realism in education 2.4- Pragmatism in education 2.5- Progressivism in education 2.6- Reconstructionism in education	Explain the meaning of idealism and discuss its principles. -Discuss the concept of naturalism and its methods of teaching. -Explain the concept of progressivism and reconstructionism.	2.1- Idealism in education - Idealism and methods of teaching -Idealism and curriculum 2.2- Naturalism in education - Naturalism and methods of teaching - Naturalism and curriculum 2.3- Realism in education - Realism and methods of teaching

	<ul style="list-style-type: none"> - Discuss the role of progressivism in curriculum. - 	<ul style="list-style-type: none"> - Realism and curriculum 2.4- Pragmatism in education <ul style="list-style-type: none"> -Pragmatism and methods of teaching Pragmatism and curriculum. 2.5- Progressivism in education <ul style="list-style-type: none"> - Progressivism and methods of Teaching - Progressivism and curriculum 2.6- Reconstructionism in education <ul style="list-style-type: none"> - Reconstructionism and methods of teaching - Reconstructionism and curriculum
<p>Unit 3: Religious philosophy (10 Hrs)</p> <p>3.1- Introduction to Hindu philosophy</p> <p>3.2- Introduction to Buddhist philosophy</p>	<ul style="list-style-type: none"> -Clarify the concept of Hindu and Buddhist philosophy. - Discuss the educational implication of Hindu philosophy in education. - 	<p>3.1-Introduction to Hindu philosophy</p> <ul style="list-style-type: none"> - Aims of Hindu philosophy - Educational implication of Hindu philosophy - Hindu philosophy and curriculum <p>3.2-Introduction to Buddhist philosophy</p> <ul style="list-style-type: none"> - Aims of Buddhist philosophy - Educational Implication of Buddhist Philosophy - Buddhist philosophy and curriculum
<p>Unit 4: Socialization of the Learners (8 Hrs)</p> <p>4.1 Concept of socialization</p> <p>4.2 Main process of socialization</p> <p>4.3 Agencies of socialization</p> <p>4.4 modes of socialization and their impact on education</p>	<p>Explore the concept of socialization.</p> <p>List out the main process of socialization.</p> <p>-Discuss the agencies of socialization.</p>	<p>4.1 Concept of socialization</p> <p>4.2 Main process of socialization</p> <p>4.3 Agencies of socialization</p> <p>4.4 modes of socialization and their impact on education</p>
<p>Unit 5: National Integration (7 Hrs)</p> <p>5.1 Concept of national integration</p> <p>5.2 measures of national integration</p> <p>5.3 Obstacles of national integration</p> <p>5.4 Role of education for national integration</p>	<p>Elaborate the concept of national integration.</p> <p>-Point out the measures of national integration.</p> <p>Discuss the role of education for national integration.</p>	<p>5.1 Concept of national integration</p> <p>5.2 measures of national integration</p> <p>5.3 Obstacles of national integration</p> <p>5.4 Role of education for national integration</p>

6. Teaching Learning Strategies

Discussion, Lecture, Project method, presentation, note making, individual study, demonstration, and seminar session will be used to clarify the suggested contents with this course.

7. Assessment and Evaluation

40% Internal and 60% External

Reference:

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Chaube, S.P. and Chaube.A. (2002).Foundations of education (2nded.).New Delhi: Vikas publishing House pvt. Ltd.

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Ozmon,A.H.and craver,S.M. (1999).Philosophical Foundation of Education (6th ed.) New Jersey: Prentice Hall,Inc.

Purkait,B.R. (2004).Principles and practices of education.India:New Central Book Agency(P.) Ltd.

Mid-West University
Graduate School of Education
B.Ed. in Mathematics Education

Course Title: Applied Mathematics
 Level: B.Ed.
 Semester: First

Course code: MATH414
 Nature of Course: Theoretical
 Credit Hours: 3

1. Course Description

Applied Mathematics aims to help the learners to solve mathematical problems of other fields as well as real life situation. It serves as a bridge between mathematical theory and real life context. Basically, Applied Mathematics includes the contents that help in solving the problems of engineering, physics, biology, finance, technology and other discipline. In the context of Bachelor program of Mathematics Education of Mid-West University, it has been developed on the basis of labor market and expected to develop the mathematical knowledge and skill on students to join the profession that meets current market demand and gain professional development.

2. Competencies

Upon completion of this course, students will be able to

1. Apply the Binomial theorem in expanding n^{th} power, finding n^{th} term and middle term /terms of Binomial expansion.
2. Solve the numerical problems related to permutation and combination in different cases.
3. Solve the problems related to Arithmetic, Geometric and Harmonic sequence and series.
4. Find the equations of straight line, angles, Pair of straight lines, circle and conics in different forms.
5. Differentiate between relation and function and find the inverse and composite of functions.
6. Use the basic rules of derivatives and anti-derivatives to solve the problems.
7. Solve the financial problems of real life contest as well as other discipline.

3. Course Contents

Unit/Content/Teaching	Learning Outcomes	Detailed Contents
Unit 1: Combinatory and Binomial Theorem (7 hour)	<ul style="list-style-type: none"> ○ Define Permutation and Combination ○ Differentiate between Permutation and Combination ○ Use the different formulas of permutation to solve the related numerical problems and combinations ○ Apply Binomial theorem to find the n^{th} term of Binomial Expansion ○ Find the middle term/terms of Binomial Expansion ○ Find the coefficients of Binomial Expansion 	3.1 Basic Principal of counting 3.2 Permutation and Combination 3.3 Cases of permutation and Combination with numerical problems 3.4 Application of Binomial Theorem in finding n^{th} term 3.5 Middle term/terms and coefficients of Binomial Expansion
Unit 2: Sequence and Series (7 hours)	<ul style="list-style-type: none"> ○ Differentiate between sequence and series ○ Find the Arithmetic mean and the n^{th} term of Arithmetic sequence ○ Solve the problems related to the sum of n terms of Arithmetic series ○ Calculate Geometric mean and the n^{th} term of Geometric sequence 	2.1 Difference between sequence and series 2.2 n^{th} term and mean of Arithmetic sequence 2.3 n^{th} term and mean of Geometric sequence 2.4 n^{th} term and mean of Harmonic sequence

	<ul style="list-style-type: none"> ○ Compute the sum of n terms of Geometric sequence ○ Find the Harmonic mean and the n^{th} term of Harmonic sequence ○ Calculate the sum of n terms of Harmonic sequence and apply the concept in other discipline 	2.5 Sum of n terms of Arithmetic, Geometric and Harmonic sequences
Unit 3: Co-ordinate Geometry (9 hour)	<ul style="list-style-type: none"> ○ Find the equation of St. lines in various standard forms ○ Derive the angle between two St. lines ○ Derive and apply Perpendicular Distance formula ○ Derive the equation of Circle in different conditions ○ Familiar with the equations of Conics (Ellipse, Parabola and Hyperbola) 	4.1 Equation of Straight lines in various standard forms 4.2 Angle between two St. lines 4.3 Pair of Straight lines 4.4 Conditions to be parallel and perpendicular of two St. lines 4.5 Equation of Circle in different conditions 4.6 Equations of Conics (Ellipse, Parabola and Hyperbola)
Unit 4: Basic Concepts of Calculus (15 hour)	<ul style="list-style-type: none"> ○ Introduce the relation and function with types and examples ○ Find composite and inverse of algebraic function ○ Define and find the Left hand and right-hand limit ○ Test the continuities and discontinuities of a function ○ Interpret geometrically the meaning of derivative ○ Use the five basic rules of derivative (sum rule, product rule, power rule, quotient rule and chain rule) to solve the problems in algebraic and trigonometric functions. ○ Apply the techniques of anti-derivatives in basic algebraic and trigonometric functions 	1.1 Cartesian Product and Relation 1.2 Types of functions, Inverse and composite functions 1.3 Limits, one-sided limits, and continuity of function 1.4 Derivatives of function and basic rules of differentiation 1.5 Concept and techniques of anti-derivatives
Unit 5: Financial Mathematics (10 hour)	<ul style="list-style-type: none"> ○ Use of Recurrence relation in calculating Compound interest ○ Establish the relationship between work and time ○ Compare the work done by the individual / groupw.r.t. time ○ Calculate the time taken/distance covered/ Work done from the given data ○ Solve the financial Linear Programming Problems by Graphical and Simplex Method 	5.1 Simple and Compound Interest 5.1.1 Review of simple and Compound Interest 5.1.2 Recurrence relation in calculating Compound interest 5.2 Time and work 5.2.1 Establish the relationship between work and time 5.2.2 Compare the work done by the individual / groupw.r.t. time 5.2.3 Calculate the time taken/distance covered/ Work done from the given data

		5.3 System of inequalities and Linear Programming Problems 5.3.1 Solution of LPP by Graphical Method 5.3.2 Solution of LPP by Simplex Method
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Instructional Techniques

- Class discussion
- Induction
- Presentation
- Group work/pair work
- Project work
- Self-study

Evaluation Scheme

Internal – 40%

External – 60%

Internal evaluation will be based on the following criteria:

- Attendance 5%
- Project Work/Assignment/Essay 15%
- Presentation 10%
- Mid-term Exam/Project 10%

External Evaluation will be based on the following criteria: Nature of questions	Total questions to be asked	Number of questions to be answered	Weightage
Multiple choice items	10	10 marks	10 Marks
Short answer questions	6 with 2 'or' questions	6 x 5 marks	30 Marks
Long answer questions	2 with 1 'or' question	2 x 10 marks	20 Marks

References

- Bajracharya, D.R., Shrestha, R.M., Singh, M.B., Sthapit Y.R & Bajracharya, B.C. (2007). Basic Mathematics. Sukunda Pustak Bhandar
- Dhawal P.K., Chand, H.B. & Khadka, M.S. (2025). *Business Mathematics II*. Dreamland Publication.
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- <https://archive.org/details/CrcEncyclopediaOfMathematics>
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Mid-West University
Graduate School of Education
B.Ed. in Mathematics Education

Course Title: Vector Analysis
 Level: B.Ed.
 Semester: First

Course code: MATH415
 Nature of Course: Theoretical
 Credit Hours: 3

4. Course Description

As an introductory course, this course is designed with the aim of imparting knowledge and skills in vector analysis, providing the students with deep-level knowledge and understanding of the operation of vectors required in teaching as well as the field of plane trigonometry, linear algebra, and geometrically related properties. The course covers basic concepts of vectors and scalars, dot product and cross product of two vectors, product of three and four scalars and vectors, vector equation of line, and plane and, introduction of the gradient, divergence, and curl of vector field. This course will be delivered through both theoretical and conceptual approaches, including demonstration and presentation, group discussion, collaborative learning, as well as practical and contextualized project works related to real-life situations. The main concern of the course is to bridge the gap between teaching vectors in school and higher-level mathematics.

5. Competencies

Upon completion of this course, students will be able to:

1. Explain the fundamental concepts of the vectors in terms of the different types, operations along with their properties.
2. Interpret geometrical meaning of the product of two, three and, four scalars and vectors.
3. Apply the theoretical and conceptual ideas of product of scalar and vectors in trigonometry, geometry, and linear algebra-related problems.
4. Solve the numerical related problems involving the product of two, three and four vectors and reciprocal system of vectors along with their properties.
5. Establish vector equation of a straight lines and a plane in different conditions, and demonstrate conditions of collinear and coplanar of the given vectors. Consequently, use these concepts to prove geometrically related theorems.
6. Conceptualize the meaning of gradient, divergence, and curl of the vector field with along their properties involving differential operator related with them.

6. Course Contents

Unit/Content/Teaching	Learning Outcomes	Detailed Contents
Unit 1: Vectors (10 hour) 1.1 Introduction of Vectors and Scalars 1.2 Operations of Vectors (Addition of vectors, subtraction of vectors, and multiplication of a vector by a scalar) and its Properties 1.3 Linearly Dependent and Independent System of Vectors, Collinear and Coplanar Vectors, and Direction Cosines of Vectors	<ul style="list-style-type: none"> ▪ To conceptualize vector and scalar quantities with real life examples. ▪ To introduce the vectors in terms of representation, different types with examples. ▪ To demonstrate vector operations as addition, subtraction, and multiplication of a vector by a scalar along with their properties. ▪ To solve numerical problems related to collinear vectors, coplanar vectors, and linear combination, and direction cosines of vector. 	<ul style="list-style-type: none"> ▪ Concepts to vectors and scalar quantities; along with examples, expressing vectors in terms of coordinates, and types of vectors: Unit vector, orthogonal vector, free and like vector, negative vector, and parallel vector, equal vector, position vector, displacement vector, and localized vector. ▪ Operation of Vectors (Addition, subtraction, and multiplication of a vector by scalar) and its properties. ▪ Linearly dependent and Independent vectors, collinear vectors, and coplanar vectors, and direction

		cosines of a vector along with related problems.
Unit 2: Product of Vectors (10hrs) 2.1 Scalar Product(Dot Product), Geometrical Interpretation, and its Properties 2.2 Vector Product, (Cross Product), Geometrical Interpretation, and its Properties 2.3 Applications of Product of Two Vectors along with Illustrations and Their Related Numerical Problems	<ul style="list-style-type: none"> ▪ To define dot product and cross product of two vectors with real life examples ▪ To interpret dot product and cross product of two vectors in geometrically. ▪ To derive properties related with dot product and cross product of the two vectors and uses these concepts in plane trigonometry, fundamental geometry and algebraic formulas. 	<ul style="list-style-type: none"> ▪ Introduction to dot product and cross product of two vectors with their geometrical meaning. ▪ Angle between two vectors ▪ Properties of dot product (commutative, distributive, and associative), and cross product of two vectors and its applications. ▪ Illustrations and numerical problems related with angle between pair of vectors, area of triangle, parallelogram, semi-circle, and quadrilateral properties, and trigonometric formula using vector method.
Unit 3: Product of Three and Four Vectors (14 hour) 3.1 Scalar Triple Product, Geometrical Interpretation and, its Properties 3.2 Vector Triple Product, Geometrical Meaning and its Properties. 3.3 Scalar and Vector Product of Four Vectors 3.4 Applications of Product of Three and Four Vectors and Related Numerical Problems. 3.5 Reciprocal System of vectors and its properties	<ul style="list-style-type: none"> ▪ To define the scalar and vector product of three and four vectors and derive along with their properties. ▪ To interpret scalar and vector triple product in geometrically and use in applied mathematics. ▪ To solve the numerical problems related with scalar and vector triple product and their properties. ▪ To demonstrate definitions of the reciprocal system of vectors and establish its properties. 	<ul style="list-style-type: none"> ▪ Introduction of scalar and vector triple product along with their geometrical interpretation and properties ▪ Expression of scalar triple product in determinant form ▪ Justification relationship between linearly dependent and scalar triple product of vectors and calculation related exercise scalar and vector triple product. ▪ Concepts to the product of scalar and vectors of four vectors along with their properties ▪ Linear relationship between four vectors ▪ Numerical problems related with product of three and four vectors. ▪ Reciprocal system of vectors and its properties
Unit 4: Vector Equation of a Line and Plane (6 hour) 4.1 Vector Equation of a Straight Line and Related Numerical Problems. 4.2 Vector Equation of Plane and Its Applications 4.3 Conditions for Collinearly of the Three Points and Coplanar of a Four Points	<ul style="list-style-type: none"> ▪ To derive vector equation of a straight line and plane and its applications ▪ To verify condition of collinearly of three points and coplanar of four points with illustrations ▪ To solve problems related equation of line and plane formed by vectors. 	<ul style="list-style-type: none"> ▪ Vector equation of a line and passing through given point and parallel to given line. ▪ Vector equation of line passes through given two points. and related numerical problems ▪ Condition for collinearly of three points and related numerical problems ▪ Vector equation of plane and derive equation passing through i) given three points, ii) given a point and

		parallel to given two lines,(iii) given two points and parallel to given a line <ul style="list-style-type: none"> Applications in geometric related properties and condition for coplanarity for four points and numerical related problems
Unit 5: Vector Operators: Gradient, Divergence and Curl (8 hour) 5.1 Scalar Field and Vector Field 5.2 Partial Derivatives of Fields 5.3 Differential Vector Operator 5.4 Gradient of a Scalar Field 5.5 Directional Derivatives 5.6 Divergence of a Vector Field 5.6 Curl of a Vector Field	<ul style="list-style-type: none"> To conceptualize scalar and vector field with illustrations. To introduce vector operations as the gradient of scalar field, divergence of vector field and curl of the vector field along with examples. To solve numerical related problems with gradient, divergence and curl in Cartesian and polar coordinate system. 	<ul style="list-style-type: none"> Basic concepts of scalar field, vector field, partial differentiation, differential vector operator with examples Introduction to gradient of a scalar field, directional derivatives, divergence of a vector field and, curl of a vector field Important identities involving differential operator related with them. Numerical problems related with gradient, divergence and curl in Cartesian and polar coordinate system.

7. Teaching Learning Strategies

The teacher can select the course in any instructional techniques according to the nature of the content, including digital and any one or more of the following instructional techniques

- Flipped techniques and ICT enhanced pedagogy
- Question-answer and discussion
- Pair work and group work, think pair share learning strategies
- Project works (both individual and team) with presentation
- Inquiry-based learning, and problem solving
- Lecture with illustrations
- Project based learning and contextualized teaching and learning approach

8. Assessment and Evaluation

There will be a provision for using two types of assessment procedures.

Internal Assessment (40%)

Internal assessment will be conducted by the course teacher based on the following activities:

Attendance	5 Points
Assignment	10 Points
Presentation	10 Points
Mid-term Exam	10 Points
Field visit	5 Points
Total	40 Points

External Assessment (60%)

The respective Examination Management Office (EMO) of the University will conduct the final examination at the end of the semester. The number of questions of different types and the mark distribution will be as follows:

• Objective questions (10 × 1 point)	10 points
• Short answer questions 6 with 2 OR questions (6 × 5 points)	30 points
• Long answer questions 2 with 1 OR question (2 × 10 points)	20 points
Total	60 points

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- Ghosh, R. K., & Maity, K. C. (2003). *Vector analysis* (7th ed.). New Central Book Agency.
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