

BME6146: GENAI TECHNOLOGIES FOR BIOMEDICAL AND HEALTHCARE APPLICATIONS

Effective Term

Summer Term 2026

Part I Course Overview

Course Title

GenAI Technologies for Biomedical and Healthcare Applications

Subject Code

BME - Biomedical Engineering

Course Number

6146

Academic Unit

Biomedical Engineering (BME)

College/School

College of Biomedicine (BD)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

BME8146 GenAI Technologies for Biomedical and Healthcare Applications

Exclusive Courses

Nil

Part II Course Details

Abstract

GenAI Technologies for Biomedical and Healthcare Applications is a postgraduate course that applies generative artificial intelligence (GenAI) technologies and robotic process automation (RPA) to solve robotics and automation problems. It consists of the following topics in biomedical and healthcare systems: 1) Introduction to GenAI, 2) Natural Language Processing, 3) Large Language Model (LLM), 4) Search Engines for Biomedical Market Information, 5) Prompt Engineering for Healthcare Report Generation, 6) Fundamental of GenAI Agents for Biomedical Applications, 7) Content Measurement for Healthcare Report Using GenAI, 8) Sentiment Analysis for healthcare content, 9) Retrieval Augmented Generation (RAG) for LLM in healthcare applications, 10) Multi-Agent Collaboration for Health Monitoring Applications, 11) RPA for Diagnosis Report Drafting, and 12) Agentic RPA for Healthcare Applications.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic principles of different artificial intelligence algorithms including GenAI, LLM, GenAI Agent and RPA.		x	x	
2	Explain representative designs and fundamental concepts on the above GenAI technologies in different biomedical and healthcare applications (e.g. healthcare report drafting, healthcare report content sentiment analysis, RAG for LLM in healthcare applications, healthcare monitoring applications, RPA for diagnosis report drafting, etc.)		x	x	
3	Apply formulated strategies that learn from this course in a project based on their ideas and market needs for different biomedical and healthcare applications.			x	x
4	Apply storytelling techniques to share the ideas of adopting GenAI technologies for biomedical and healthcare applications.			x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will develop, expand and consolidate key concepts related to the course materials.	1, 2	2 hrs/week for 12 weeks
2	Tutorials or guest lectures	Students will participate in-class exercises thoughtfully designed by the lecturer/tutors and discuss relevant topics in sharing sessions held by guest speakers.	1, 2, 3	1 hr/week for 12 weeks
3	Project presentation	Students will discuss, clarify, and debate with their peers about on their novel GenAI ideas in the project presentation sessions.	1, 2, 3, 4	4 hrs for 1 week

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3	20	-	Yes
2	Project Report and Presentation	1, 2, 3, 4	20	-	Yes
3	Mid-term Examination	1, 2, 3	20	Duration: 1.5 hours	No

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)**Assessment Task**

Assignments

Criterion

ABILITY to REPORT the principles, theory, and applications related to the 5 AI algorithms in biomedical and healthcare applications.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Mini-project report and presentation

Criterion

ABILITY to EXPLAIN the ideas and applications of the adoption of AI algorithms in biomedical and healthcare applications.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

ABILITY to ANALYSE the fundamental of 5 AI algorithms in biomedical and healthcare applications.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Biomedical, healthcare, Generative Artificial Intelligence, Large Language Model, Natural Language Processing, GenAI Agent, Robotic Processing Automation

Reading List

Compulsory Readings

Title	
1	N.A.

Additional Readings

Title	
1	JS Collins Generative AI Essentials For Beginners: Boost Your Artificial Intelligence Skills With Innovative Tools To Write, Create, And Edit Content With Ease ISBN 979-8274018203
2	Anjanava Biswas, Wrick Talukdar Building Agentic AI Systems: Create intelligent, autonomous AI agents that can reason, plan, and adapt ISBN 978-1803238753
3	Paul Iusztin and, Maxime Labonne LLM Engineer's Handbook: Master the art of engineering large language models from concept to production ISBN 978-1836200079
4	Salvatore Raieli, and Gabriele Iuculano Building AI Agents with LLMs, RAG, and Knowledge Graphs: A practical guide to autonomous and modern AI agents ISBN 978-1835087060
5	Christopher Raynor The Most Complete AI Agentic Engineering System: Step-by-step guide to build, optimize, and scale LLM agents—with exclusive monthly and rigorous ... metrics, and built-in self-improvement ISBN 979-8267991407
6	Tom Taulli The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems ISBN 978-1484257289