

FACILITIES

A. Offices, Classrooms and Laboratories

Summarize each of the program's facilities in terms of their ability to support the attainment of the student outcomes and to provide an atmosphere conducive to learning.

Offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment that is typically available there.

Classrooms and associated equipment that are typically available where the program courses are taught.

Laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction. Include those facilities used by students in the program even if they are not dedicated to the program and state the times they are available to students. Complete Appendix C containing a listing of the major pieces of equipment used by the program in support of instruction.

Offices (Administrative, Faculty, Clerical, Teaching Assistants)

The School of Chemical Engineering (SCE) personnel offices are located in three buildings; Administrative Building, VARNERO and Laboratory Buildings. The staff of the school is composed of 29 employees (including School Dean, School Academic Quality Assurance, Technical Assistant, Computer attendant and Clerical), all working together to support students and faculty in their academic affairs. They all collaborate to assist students with their academic endeavors, and also oversee school-wide operations like admissions and communications, help undergrads with extracurricular activities like student organizations, offer financial support, and counsel students on matters of safety and subject matter pertinent to projects linked to their academic pathways.

Two administrative assistants support the School of Chemical Engineering. Dr. Edo Begna, Dean School of Chemical Engineering and Ms. Ebise Getacho, School Academic Quality Assurance. These individuals assist in supporting the school's administrative needs, including academic

recordkeeping. Their Office is located in “Administrative Building” Room C-00068, and Room C-00063, respectively. The offices of the administrative assistants are equipped with Copy machines, Printers and scanners for faculty use.

All other individuals’ offices are located in the Administrative Building, VARNERO and JiT Laboratory Building, and are equipped with personal computers with internet access and shared equipment in each location. Office space and equipment are adequate to support the attainment of the Program Educational Objectives and Student Outcomes.

Table 7.1: Offices of School of chemical engineering employers

No.	Faculty members	Position	Office no.	Building
1.	Dr. Edo Begna	School Dean	C-00068	Admin
2.	Ms. Ebise Getachew	SAQA	C-00063	Admin
3.	Yigezu Mekonnen	Faculty member	C-00067	Admin
	Tafere Aga			
	Fikadu Abera			
4.	Ketema Beyecha	Process Eng. Chair	C-00066	Admin
5.	Yasin Ahmed	Faculty member	C-0065	Admin
	Dr. Wondwosen Sime			
6.	Dr. Dereje Tadessa	Faculty Member	C-00064	Admin
	Bulcha Belay			

7.	Mohammed Seid	Faculty member	SO-8109	Varnero
8	Girma Assefa	Faculty member	SO-8108	Varnero
	Bune Ere			
9	Tsigab T/ab	Faculty member	SO-8102	Varnero
10	Alfiya Demoze	Faculty member	SO-5304	Varnero
	Meron Asteraye			
11	Dingeta Serdo	Teaching Assistant		Laboratory
	Workineh Sorsa			
12	Milkaye	Teaching Assiatant		Laboratory
	Defar Getahun			
13	Nigist Addisu	Clerical	C-00069	Admin
		Total	13	

Classrooms

Jimma University, Jimma Institute of Technology, maintains classrooms throughout the campus to which SCE has access as needed. As part of course scheduling, classrooms are centrally assigned based on course needs and enrollment. Classroom space supports an atmosphere conducive to learning and is adequate to support the Program Educational Objectives and Student Outcomes. Classrooms which SCE uses include two 40-seat classrooms (RAMA Class Room 3101 and 3102), two 40-seat smart classrooms equipped with fixed projection systems and internet access (VARNERO Class Room 7201 and 7202), and one 40-seat room (VARNERO Class Room 7001).

In addition, SCE has two computer classrooms. A 40-station computer classroom is located in VARNERO Class Room 7203, and a 40-station computer classroom is located in RAMA Class Room 4104. All classrooms have an area of 97 square meters.

Laboratory facilities

The SCE laboratory facilities for both teaching and research are of high quality and support the attainment of the SCE Program Educational Objectives and Student Outcomes. In general, there are five teaching laboratories, five research laboratories, and one chemical store under SChE.

Fluid Machine Lab (CHEG 3221), Reaction Engineering Lab (CHEG 4127), Mechanical Unit Operation Lab (CHEG 3111), and Process Control and Instrumentation Lab (CHEG 4129) are located in JiT Laboratory Building Block-3 1440 Room 1, 2, 4, and 5, respectively. Thermal and Mass Transfer Unit Operation Lab (CHEG 4125) is located in the same building Block-3 1080, Room 4. All laboratory sections have a size ranging from 98 m² to 147 m². These rooms are designed as a laboratory teaching space to accommodate 25 students and has a seating area with tables and whiteboard for discussion as well as bench space for hands-on activities. In addition, the laboratory contains standard facilities, including two and three phase cables with 220/415-volt electrical power, water, and some Safety equipment such as an eye wash station, a fire extinguisher, and several first aid kits. For safety reasons, the teaching laboratory is only available to students during scheduled course times. Over \$400,000 of departmental funds have been invested in equipment purchases for these labs since 2016. Appendix C contains a list of major instructional and laboratory equipment. The SCE also uses an interdisciplinary laboratory in another campus for Organic and Inorganic chemistry lab courses.

The main experimental lab equipped with material size reduction and agglomeration, separation process, Reaction, and characterization facilities. The Chemical Engineering program uses equipment to support instruction. The table below has the list of major laboratory equipment facilities with its corresponding process and course that directly applied.

I. Mechanical Unit Operation Lab

S/N	Equipment Name	Process and activity
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1.	Fixed and Fluidized Bed Apparatus	To study about the flow of a fluid through a particles bed, both fixed and fluidized.
2.	Ball Mill equipped with one drive roller and one loose roller	To show how material is increasingly reduced in size in a continuous milling process.
3.	Jaw crusher	To crushes large rocks/ material to a more usable size
4.	Sieves stack/set up	To expose the particles in a sample to all the openings in each sieve in a stack
5.	Batch and continuous sedimentation tank	To demonstrate the sedimentation process and to familiarize with the settling principle of discrete particles settling into a tank
6.	Mixing tank	To hold and mix substances to achieve a uniform composition

II. Thermal and Mass Transfer Unit Operation Lab

S/N	Equipment Name	Process and activity
1.	Suspension Production Unit equipped with Nutsch Vacuum Filter	To provides the experimental filtration units with a suspension of diatomite and water.
2.	Gas Absorption	Separating CO ₂ gas from water.
3.	Spray dryer	To separates solute as solid, solvent as vapor; material is collected in a drum or cyclone
4.	Force draft tray drey	To drying characteristics of a solid under forced draft condition

5.	Heat exchanger	To study thermal energy is transferred from the hot water to the cold water.
6.	Continuous Rectification	To separate volatile matter from non volatile
7.	Solid-Liquid Extraction	To extract liquid from solid using solvents

III. Reaction Engineering Lab

S/N	Equipment Name	Process and activity
1.	Supply Unit for Chemical Reactors	To determine of the conversion depending on the reactor type, the retention time in the reactor, the temperature, the concentration and the basics of a saponification reaction using Tubular Reactor, stirred tank reactor, series and Batch Reactor

IV. Fluid machine Lab

S/N	Equipment Name	Process and activity
1	Supply Unit for Fluid machine	To determine Flow meter, Energy losses measuring in bend pipe, Hydraulic bench, Osborne Reynolds, Pumps and Flow visualizing in channels
S/N	Equipment Name	Process and activity

	Liquid level controller	To regulating Liquid level system,
	Temperature controller system	To regulating Temperature system
	Pressure controller system	To regulating Pressure system

v. Process Control and Instrumentation

S/N	Equipment Name	Process and activity
1.	Liquid level controller	To regulating Liquid level system,
2	Temperature controller system	To regulating Temperature system
3	Pressure controller system	To regulating Pressure system



Fixed and Fluidized Bed Apparatus



Ball Mill



Jaw crusher



Seives Stack



Continuous sedimentation tank



Batch sedimentation tank



Suspension Production Unit equipped with Nutsch Vacuum Filter



Armfilled chemical reactor equipped with Tubular Reactor, stirred tank reactor, series and Batch Reactor



Gunt chemical reactor equipped with Tubular Reactor, stirred tank reactor, series and Batch Reactor



Flow meter demonstrator



Energy loss demonstrator



Pumps and Flow visualizing in channels



Level controller



Temperature controller



Pressure controller



Process regulator equipped with Liquid level system, regulating Temperature system and regulating Pressure system



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campus, etc. State the hours the various computing facilities are open to students. Assess the adequacy of these facilities to support the scholarly and professional activities of the students and faculty in the program.

Jimma Institute of Technology has a variety of computing resources throughout campus available for all students and faculty for academic purposes. The diverse range of classrooms facilitates a productive teaching education experience. From computers to whiteboards, projectors, and printers, to comfortable seating, appropriate lighting, and easy access, these facilities are ideal for the support of scholarly and professional activities for the Chemical Engineering Program.

The two computer class rooms (VARNERO 7203 and RAMA 4104) were designed to encourage discussion and interaction among students in smaller classes and lectures alike. Students have full access to the computer lab at any working hour. However, students are also encouraged to use their personal computer wherever convenient. This lab is also available for individual student research and can be used as a general-purpose teaching computer lab classroom. The computers are Dell and hP Core i3 an i5, and the plan is to increase the capacity of these computers. The institute library also provides access to one hundred computers accessible to Chemical Engineering program students for individual student research and access to the internet and digital resources. This computer lab is available 5 working days a week, 8 hours/day. Those computers, VARNERO 7203 and RAMA 4104, are all outfitted with the following softwares: MATLAB, Mendeley, Design Expert, Origin-pro, MS Word, WordPerfect, MS Excel, MS PowerPoint and Aspen HYSYS. The chemical engineering courses that have utilized this computer lab include ECEG 2052, CHEG 3107, CHEG 5138 and SRP 5252.

Table 7.2: Computer resource of School of Chemical Engineering

No.	Location	Building	Number of computers	Model/Configuration
1.	Administrative Office	Admin C	4	Dell corei3 and Hp corei3
2.	Instructors' office	Admin C	9	Dell corei3 and Hp corei3

		Varnero	11	Dell corei3 and Hp corei3
3.	Clerical office	Admin C	2	Dell corei5 and Hp corei3
4.	Computer lab	Varnero and Rama	82	Dell corei3, i5 and Hp corei3, i5
5.	Lab Assistant Office	Laboratory Building	4	Dell corei3, and Hp corei3
6	Library	Library	100	Dell corei3, i5 and Hp corei3, i5
7	Laboratory class	Laboratory Building	5	Dell corei3, and i5
8	Total		317	

3. Guidance

Describe how students in the program are provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories.

The program provides students with appropriate guidance on the use of the tools, equipment, computing resources, and laboratories by course instructors and teaching assistants (TAs). Prior to entering the laboratory, students are instructed in all safety guidelines, and appropriate signage is clearly posted. The instructor teaching the Laboratory course, along with the associated Teaching assistant (4 full time laboratory technicians serving as lab assistants), instruct students on the safe and proper use of equipment. All TAs receive laboratory safety training upon entering the department. During the lab course, those technicians work closely with laboratory instructors to ensure a safe learning environment.

The Program Faculty also instructs students on the availability and use of software needed throughout the curriculum. For example, the instructor of Chemical Engineering Numerical Method (CHEG 3107) gives at least four lectures on the application of MATH LAB software in

RAMA 4104, equipped with computers and a projection system. Based on these lectures, students are able to use this software tool for solving complex engineering problems numerically.

In addition, all staff members are active participants who provide professional and technical support for research and educational projects. They serve as a resource for students in career counseling, advising, and networking. They also work closely with faculty on curriculum improvements, equipment assessment, and any other related topics to ensure the course objectives and student outcomes are being met.

4. Maintenance and Upgrading of Facilities

Describe the policies and procedures for maintaining and upgrading the tools, equipment, computing resources, and laboratories used by students and faculty in the program.

The JiT Campus has ICT center maintenance team and ICT technicians who install, maintain and manage laboratory equipment for the educational and research programs. For the facilities that are under the control of the Chemical Engineering Program, the Program Faculty maintain and periodically upgrade laboratory equipment. The equipment are checked and tested regularly by the Technical Assistant to ensure safe and proper performance. As needed, the JiT maintenance team can also assist with the equipment maintenance and preparation. Computing resources are monitored remotely, upgraded, and maintained by JiT ICT center, and disk image software is upgraded annually. If new equipment is needed, the School Dean makes the request directly to the JiT laboratory managing directorate office. Decisions on acquisition are made based on need and availability of resources.

5. Library Services

Describe and evaluate the capability of the library (or libraries) to serve the program including the adequacy of the library's technical collection relative to the needs of the program and the faculty, the adequacy of the process by which faculty may request the library to order books or subscriptions, the library's systems for locating and obtaining electronic information, and any other library services relevant to the needs of the program.

Library resources support the academic and research pursuits of students, faculty, and staff. They encompass diverse materials and services to enrich the learning experience and facilitate scholarly exploration. In accordance, Jimma University library provides a vast collection of books, periodicals, and online resources related to the Chemical engineering program. In addition to this, the university website also hosts the National Academic Digital Library of Ethiopia (<http://ndl.ethernet.edu.et/>) where students have access to over one thousand Chemical engineering references. While there is no dedicated specialized Chemical engineering library for the Chemical Engineering program, there is a special section in the institute library that contains more than 500 collections of books, Thesis, articles and reference materials on Chemical engineering that are available to students 24 hours a day. Students also have access to computer labs equipped with computers, printers, and industry-standard software for Chemical engineering design and modeling.

Online, On-site, or Hybrid Learning Formats

Currently, the Chemical engineering program utilizes an on-site learning format requiring students to reside in a university-provided dormitory. Students are required to attend lectures, workshop lectures and discussions. In the Chemical engineering program, students are made to reside in the same dormitory by the student services to allow them further interactions and exchanges of ideas away from the classroom environment. This approach will enable us to leverage the physical resources available while providing students with hands-on experience and enhanced social interaction in our physical facilities.

Institutional context and administrative structure of the library and visual resources

The Jimma University Library System (JULS) operates under the authority of the University's Academic Vice President and is managed at the directorate level. A library head is responsible for overseeing the branch libraries. Several team leaders are responsible for various activities, such as the technical, library ICT, research and training, and user service teams, each with subdivisions.

Historically, the Jimma University Library System (JULS) was used to acquire resources primarily in hard copy format. However, the library has transformed these hard copies into soft copies and uploaded them to the digital library to digitize the library system. Currently, the digital library

houses 437 resources, predominantly books. Besides, hard copies of these resources remain accessible to students and staff members. Dedicated desktop computers are available in JiT's branch library for students to access these digital resources. Additionally, the library staff had created and implemented the J.U. Library App, an Android-based smartphone app that enables students and staff to access digital resources. Students and instructors utilize them for teaching, learning, research, and community services, which are the fundamental pillars of Jimma University.

The university has hired library professionals, initially bachelor's degree holders, and has provided them with long-term training (an MSc degree) to enhance their skills. Most of these professionals now hold master's degrees and are dedicated to the growth of the library's collection. Two strategies are utilized for this purpose. The first involves subscribing to online journal databases with annual license renewals, for which the university allocates funds. The second strategy consists in collecting free e-resources and making them accessible to students and staff on the library's website.

One subscribed journal database is the Wiley Online Library, which hosts an extensive collection of over 1,600 journals and 22,000 books. Under the categories of Chemical engineering, numerous resources are available across various sub-fields of Chemical engineering. These resources significantly enrich the subject areas offered to students and staff.

Most importantly, the librarians at JULS are dedicated to fostering an informed society and promoting lifelong learning. There are ten branch libraries on all campuses of Jimma University, including the new campus, Agaro Campus, which has started enrolling students in the 2022–23 academic year. Of these branch libraries, one is a special needs library, and another is a females' library located on the main campus of Jimma University. Jimma University Library System (JULS) provides its patrons with a wide range of information resources, both digital and physical. Here's a summary:

1. **Digital Library:** Jimma University's digital library is a vast resource for students and faculty, housing a total of 41,851 resources currently. Notably, more than 500 resources are tailored to the Chemical engineering program, accessible through the university's digital library

system. These resources include both digital-born and non-digital-born (Digitized by the librarians).

2. **E-Resources:** JULS offers a variety of electronic resources for its users:

a. **Subscribed Journals:** The library subscribes to four major databases: Emerald, Springer, Wiley Online Library, and IEEE. Specifically, the Wiley Online Library contains numerous resources relevant to Chemical engineering subject areas.

b. **Open Access Journals:** A collection of open access journals is available to users, curated by the librarians at JULS. Websites like the Institute of Engineering and Technology offer many electronic resources pertinent to Chemical engineering.

c. **Free E-Books:** A selection of free e-books is available on the JULS website for staff and student use, sourced from PDF Drive, Library of Genesis, and Project Gutenberg. These sites host an extensive array of resources in the field of Chemical engineering.

3. **Institutional Repository:** JULS hosts an online institutional repository containing research documents such as thesis and journal articles. These documents are openly accessible from any location with an internet connection by an institutional policy approved by the Jimma University Senate. From the institutional repository under chemical engineering more than 50 articles and 30 thesis is available on the JULS.

4. **OPAC:** The Online Public Access Catalog (OPAC) is an online database of library materials, essentially a digital version of a card catalog. Developed using KOHA software, the OPAC system allows students and staff to search for materials from any location within the Jimma University campuses.

In addition to these digital resources, JULS also houses a large collection of physical resources, including books, manuals, theses, abstract books, magazines, and more, covering various subject areas, including Chemical engineering subject areas.

Libraries and Librarians

University and college libraries serve as expansive knowledge repositories, housing an extensive collection of books, e-books, journals, and research databases. These libraries cater to the varied needs of the academic community and offer access to reference materials like bibliographies, dictionaries, glossaries, encyclopedias, handbooks, and geographical sources.

Within academic institutions, librarians assume a vital role as invaluable resources themselves. Their expertise in navigating the library's extensive resources allows them to assist students with general inquiries and research projects and effectively utilize its vast offerings.

Research Databases

Universities often provide access to specialized research databases. These databases are valuable resources that students and faculty can utilize to access scholarly journal articles, research papers, and other pertinent materials. Licensed by the university, these databases serve as gateways to the latest academic research, supporting comprehensive scholarly exploration.

Technology Services

Recognizing the significance of technology in education, universities, and colleges offer a range of technology services. These services include computer labs, laptop access, collaborative study spaces equipped with state-of-the-art technology, printing facilities, and other technology-related resources. Such services empower students and faculty to leverage technology for their academic and research needs. Collectively, these information resources contribute to fostering an enriched educational environment, facilitating knowledge acquisition, promoting research excellence, and nurturing intellectual growth within universities.

Developing and curating comprehensive collections; identifying and supplying learning resources to faculty, researchers, and students; managing available resources efficiently, effectively, and economically; creating an inclusive study environment that accommodates diverse learning styles; collaborating with users to understand their needs and working with management and other university services to meet those needs, providing training to users and staff to enhance their information literacy skills for optimal utilization of information resources; engaging in

professional development activities to improve the library's multifaceted services; and establishing and maintaining strong connections with other domestic and international library systems.

At JULS, the following services are provided for the students and staff members of the university:

- Providing access to a wide range of academic resources and materials.
- Assisting users in navigating and making the best use of information resources.
- Offering a conducive environment for research, learning, and collaboration.
- Organizing workshops and training sessions to enhance information literacy skills.
- Collaborating with faculty and researchers to support their scholarly endeavors.
- Continuously exploring new technologies and practices to improve our services.
- Fostering partnerships with libraries and institutions globally to broaden access to knowledge.