

Industrial Technology

The following matrix indicates those courses deemed transferable among institutions listed across the top of the matrix. The numbers on the matrix represent the number of semester hours associated with the course at each institution and which institutions have agreed to transfer the commonly numbered course in each row.

You can view the group leaders at the bottom of the page. If you are interested in printing this page, please note that it is best to print in landscape mode.

Prefix	Number	Gerta	Course Title	NDSCS	UND
IT	110		Principles of Industrial Technology		2
IT	122		Computer-Aided Design Drafting		3
IT	201		Electromechanical Fundamentals		3
IT	202		Technical Drawing		3
IT	203		Production Processes: Manufacturing		3
IT	204		Industrial Materials		3
IT	211		Electric Circuits and Devices		3
IT	212		Principles of Graphic Design and Layout		3
IT	213		Production Processes: Construction		3
IT	223		Applied Synthetics		3
IT	300		Technology, Society, and the Individual		3
IT	301		Microelectronic Circuits		3
IT	302		Web Page Design		3
IT	311		Microcomputer Hardware		3
IT	322		Fundamentals of Photography		3

Prefix	Number	Gerta	Course Title	NDSCS	UND
IT	330		Quality Assurance		3
IT	332		3D Design		3
IT	337		Cooperative Education		3
IT	340		Cost Estimating		3
IT	341		Digital Integrated Circuits		3
IT	373		Manufacturing Automation Systems		3
IT	400		Teaching Technology Education		3
IT	403		Product Research and Development		3
IT	404		Materials Testing		3
IT	411		Integrated Mechanical Fluid Systems		3
IT	412		Design/Drafting		3
IT	420		Facilities Design		3
IT	422		Digital Photography & Imaging		3
IT	433		Manufacturing Strategies		3
IT	442		Desktop Publishing		3
IT	450		Senior Capstone		3
IT	451		Control systems		3
IT	452		Multimedia Production		3
BIOT	101		Introduction to Biotechnology I	3	
BIOT	102		Introduction to Biotechnology II	3	

Prefix	Number	Gerta	Course Title	NDSCS	UND
BIOT	210		Biotechnology Methods I	3	
BIOT	220		Biotechnology Methods II	3	
BIOT	230		Fundamentals of Bioprocessing	3	
NANO	206		Microelectronics Laboratory Instrumentation	5	

IT 110 Principles of Industrial Technology

Course Objectives

- A. The student will be introduced to the technology systems that are an integral part of industry, i.e., Communication Systems, Electronics and Computer Hardware Systems, Manufacturing Systems, and Occupational Safety and Environmental Health.
- B. The student will recognize the basic concepts of Industrial Technology including: organization, company management, processing and systems, safety, research and development, production, marketing, finance and control, personnel and external relations.
- C. The student will be exposed to experiential activities that are representative of the Technology Systems areas found in Industrial Technology.
- D. Students will have the opportunity to visit local industry and gain an understanding of the opportunities available in the career field.
- E. Students will interact with professionals in the field who serve as guest speakers.

IT 122 Computer-Aided Design Drafting

This course introduces the student to computer aided design/drafting with AutoCAD. It is a combination of lecture, hands on exercises and drawing problems used in industry and business.

IT 201 Electromechanical Fundamentals

The study of fundamental, mechanical, hydraulic, and pneumatic, and electrical apparatus used in power systems.

Prerequisites: MATH 103, PHYS 101 and 102.

IT 202 Technical Drawing

The study of technical drawing techniques to include various projections, pictorials, dimensioning, development and tolerancing used in business and industry. Prerequisite: MATH 103.

IT 203 Production Processes: Manufacturing

Fundamental concepts of processing industrial materials, especially those utilized in manufacturing products, with emphasis on tools and techniques. Prerequisite: IT 103.

IT 204 Industrial Materials

The study of characteristics, structure, properties and physical nature of organic and inorganic materials. For industrial conversion processing, to include wood, metallics, ceramics, polymerics and composites.

IT 211 Electric Circuits and Devices

Concepts, principles, and operational characteristics of electric components and circuits. Hands-on operation and experiments of electric devices and equipment. Prerequisites: IT 201 and MATH 103 and 105.

IT 212 Principles of Graphic Design and Layout

Basic concepts, processes, and techniques involved in image generation, image reproduction, bindery, and estimating.

Student learning objective: To understand and apply the processes, methods and techniques of image design generation and print production.

IT 213 Production Processes: Construction

A study of material processing methods and techniques utilizing tools and machines leading to the production of constructed assemblies. Prerequisites: IT 110 and 204 or consent of instructor.

At the conclusion of the course the student should be able to:

- Exhibit safe work habits and correctly use the machines used in woodwork processes.
- Exhibit craftsmanship skills in the layout, milling assembly, and finishing of woodwork projects.
- Identify the various joints used in woodworking and describe their appropriate application.
- Perform limited maintenance on woodworking tools and equipment.
- List or describe the contributions, to the standard of living in our society, provided by the cabinet making industry.
- List or describe the elements of design, which should be applied when designing cabinets or furniture.
 - Understand the tolerances and fits in manufacturing.
- Understand the basic design concepts in the development of tooling (jigs and fixtures)

- Produce a product using effective mass production techniques.

IT 223 Applied Synthetics

A study of synthetic polymer materials emphasizing identification of characteristics and properties; and their application as related to industrial products. Prerequisite: CHEM 104 or 105.

IT 300 Technology, Society, and the Individual

An introductory lecture-recitation course emphasizing technology effects on the individual-society-technology matrix of various cultures.

IT 301 Microelectronic Circuits

Study of electronic components and circuits (discrete and integrated) and their functional and operational characteristics. Prerequisite: IT 211.

IT 302 Web Page Design

Introduction to electronic publishing on the Internet through design, layout and production of web pages. Emphasis on production of graphics, interface design, and navigability. Prerequisite: IT 212 or consent of instructor.

IT 311 Microcomputer Hardware

An introductory course to microcomputer hardware maintenance that presents the full scope and understanding of how computers should function and be managed. This course includes in-depth understanding of microcomputer components, troubleshooting, diagnostic procedures, and upgrading. Course concludes with descriptions of third party systems and how emerging trends in microcomputer configuration impact the maintenance function. Fall
Prerequisite: IT 201 or consent of instructor.

IT 322 Fundamentals of Photography

Fundamentals of Photography is a lecture/laboratory course designed to introduce students to the art and science of black and white photography.

IT 330 Quality Assurance

Theoretical and laboratory study of industrial quality control methods, instrument and systems measurement techniques, and data handling procedures. Prerequisite: ECON 210 or consent of instructor.

IT 332 3D Design

Through a combination of lecture, hands-on exercises, and drawing assignments, this course introduces the student to the 3D features of AutoCAD. Topics covered include: 3D coordinates and layout, subsurface meshes, regions, and solid modeling. The creation of presentation graphics using bitmap files, shading, and rendering is also discussed. Prerequisite: IT 122 or consent of instructor.

IT 337 Cooperative Education

A practical work experience with an approved industrial enterprise. Arranged by the student, department and employer. Prerequisites: Junior standing; a 2.5 overall GPA, and departmental approval.

IT 340 Cost Estimating

Principles and techniques necessary for the economic analysis and evaluation of industrial design projects. Prerequisite: Econ 210, Math 146 or equivalent, or instructor consent.

IT 341 Digital Integrated Circuits

the study of basic concepts of digital circuits and devices; operational characteristics of digital integrated circuits. Prerequisite: IT 211 or consent of instructor.

IT 373 Manufacturing Automation Systems

The study of the fundamentals of automation as it relates to automated production environments. Students will examine the forms of computer-based automation systems used in the various areas of a manufacturing system and how systems can be integrated through data communication networks. Topics include NC and CNC programming and systems, computer assisted parts programming, industrial robot configuration, industrial automation applications, and integration of control systems and manufacturing technology. Prerequisites: IT 201, IT 203 and IT 122 or equivalent.

IT 400 Teaching Technology Education

An analysis of various methods employed in instructional techniques for industry and education. Development of methods and strategies of instruction use and ordering of instructional materials, based on behavioral objectives and classroom application of instructional techniques; lab activities. Prerequisite: Junior Standing and consent of instructor.

IT 403 Product Research and Development

The study of product development and production planning for manufacture through the application of research methodologies, design processes, and proto-type development. Prerequisites: IT 203 or consent of instructor.

IT 404 Materials Testing

Methods by which properties (i.e., physical, mechanical, thermal, electrical, optical, acoustical, and chemical) of industrial materials are tested for determination of applications. Prerequisites: IT 201, 202, 203, 212, CHEM 103 or equivalent.

IT 411 Integrated Mechanical Fluid Systems

This course focuses on modern mechanical fluid power systems including laws of mechanics, components, circuits, and instrumentation. Laboratory activities will emphasize the control and utilization of fluid systems through mathematical problem solution, fluid system design, and simulation software. Prerequisites: IT 201.

IT 412 Design/Drafting

The application of design and drafting techniques for the design of tools, machines and products. Selected topics included are the design process, material selection, fabrication process and ergonomics. Prerequisite: IT 312 or consent of the instructor.

IT 420 Facilities Design

Principles and applications of designing industrial facilities with emphasis on site location, environmental consideration, qualitative and quantitative modeling. The course utilizes computers in facility planning and quantitative analysis. Prerequisites: MATH 204 or 211, IT 312.

IT 422 Digital Photography & Imaging

This advanced course in photography focuses on the concepts, processes, technologies and applications of digital photography and imaging. It includes the utilization of cameras, digitizing technologies, and computer software designed specifically for creating, processing and editing images. Topics include this technology's history, ethics, legal and regulatory issues, creative and scientific processes, and applications. Spring Prerequisites: IT 322 or consent of instructor.

IT 433 Manufacturing Strategies

Theoretical and laboratory study of strategies utilized by business and industry to develop and maintain a competitive edge. Topics include lean manufacturing, Kanban, five S's, Kaizen, push and pull modeling, fishbone-4Ms, line balancing, and Pokayoke. Prerequisites: IT 203 and 122 or equivalent.

IT 442 Desktop Publishing

The course is designed to provide a broad understanding of computer-assisted publishing. It consists of lecture,

discussion, and practical laboratory activities in the areas of current developments in hardware and software, input/output equipment materials, and processes of electronic publishing. Prerequisites: IT 212, 302 or consent of instructor.

IT 450 Senior Capstone

The capstone course is designed to integrate coursework covered throughout the student's experience at UND, specifically those within the IT program: strategic planning; product design and manufacturing; finance and distribution strategies, and quality processes and assessment schemes. Student teams will work collaboratively to create an environment that incorporates various elements of their technical expertise to produce an end product that is saleable. Prerequisites: Senior standing and consent of instructor.

IT 451 Control systems

A study of computer integrated systems and their designs as utilized by industry to facilitate the manufacturing and production processes. Subject matter to be covered includes, but is not limited to; Programmable Logic Controllers (PLCs), microcontrollers and robots. Students will also utilize commercial computer-aided design tools, i.e., MultiSim and Utiboard to design, test, and manufacture their own circuit boards where necessary. Prerequisites: IT 211.

IT 452 Multimedia Production

Lecture/lab class designed to explore multimedia production technologies including principles of animation, 3-D rendering, and interactive programming. The course provides hands-on experience through the production of a comprehensive project in which students examine the design principles and interface guidelines used in digital communication technologies. Prerequisites: IT 302 or consent of instructor.

BIOT 101 Introduction to Biotechnology I

BIOT 101 is the first part of a two course sequence designed to serve as an introduction to the field of biotechnology, it's historical development, it's current and future status and the technologies used to achieve the progress to date. All aspects of biotechnology's impacts on our society are explored including the agriculture, medical, food science, pharmaceutical and environmental segments. The course covers the science behind the developments, the ethical challenges and societal implications associated with the past, current and future developments. Specific focus is given to developing a foundational understanding of the vocabulary and basic science associated with this field along with an appreciation for the extent the biotechnology field plays in the US and world economies.

BIOT 102 Introduction to Biotechnology II

BIOT 102 is the first part of a two course sequence designed to serve as an introduction to the field of biotechnology, it's

historical development, its current and future status and the technologies used to achieve the progress to date. All aspects of biotechnology's impacts on our society are explored including the agriculture, medical, food science, pharmaceutical and environmental segments. The course covers the science behind the developments, the ethical challenges and societal implications associated with the past, current and future developments. Specific focus is given to developing a foundational understanding of the vocabulary and basic science associated with this field along with an appreciation for the extent the biotechnology field plays in the US and world economies.

BIOT 210 Biotechnology Methods I

BIOT 210, Biotechnology Methods I is the first semester of a two semester sequence of courses designed to train laboratory technicians in the fundamental technologies, procedures and process utilized within the biotechnology industry. The course will emphasize technical skills development, record keeping and communication skills, compliance with federal regulations and conformity to cGMP/cGLP standards. The course will meet for one hour of lecture and four hours of lab each week. Additional lab time may be required for completion of certain units.
Pre-requisite- NANO 205 - Laboratory Instrumentation

BIOT 220 Biotechnology Methods II

BIOT 220, Biotechnology Methods II is the second semester of a two semester sequence of courses designed to train laboratory technicians in the fundamental technologies, procedures and process utilized within the biotechnology industry. The course will emphasize technical skills development, record keeping and communication skills, compliance with federal regulations and conformity to cGMP/cGLP standards. The course will meet for one hour of lecture and four hours of lab each week. Additional lab time may be required for completion of certain units.
Pre-requisite - BIOT 210

BIOT 230 Fundamentals of Bioprocessing

BIOT 230, Fundamentals of Bioprocessing is designed to train laboratory technicians in the fundamental technologies, procedures and process utilized within the biotechnology industry in the manufacturing /bioprocessing of biologically derived products. The course will emphasize the basic science, cellular metabolism and growth techniques used in the industry, specific examples of bioprocessed products currently on the market, compliance with federal regulations and conformity to cGMP/cGLP standards.
Pre-requisite - BIOT 210 & 220

NANO 206 Microelectronics Laboratory Instrumentation

Microelectronics Laboratory Instrumentation (NANO 206) is an intensive combined lab/lecture course designed to expose students to some of the more basic laboratory instrumentation, practices and applications utilized in research and industrial laboratory settings. Most if not all of the techniques covered have direct application in the new and rapidly emerging fields of microelectronics technology. The course is broken up into six distinct modules, each focusing on specific skill sets critical to a laboratory technician in general. The course is designed to establish:

1. a basic understanding of theory behind, applications of and procedures utilized in the proper use of the technologies,
2. minimum levels of competency in the proper use and care of the equipment as well as the proper methods utilized in the recording, analysis and reporting of data.

Microelectronics technology is a field of scientific study which is cross disciplinary and encompasses the broad areas of chemistry, physics, electronics, materials science and engineering. Microelectronics involves the science and engineering aspects involved with manufacturing of microelectronic sensing and communication devices such as RFIDs, MEMS, accelerometers, sensors, microcontrollers and other industry-related integrated circuits.

The following individuals are leaders for this discipline. Those marked with an asterisk (*) are chairs.

Name	Institution	Email Address	Phone Number
DeShawn Lawrence	CCCC	Deshawn.lawrence@littlehoop.edu	701-766-1342
Steve Johnson	NDSCS	steve.johnson@ndscs.edu	701-671-2478
Shane Suko	NDSCS	Shane.suko@ndscs.edu	701-671-2731
Lisa Johnson	NDUS	lisa.a.johnson@ndus.edu	701-328-4143
Jen Janecek-Hartman	NHSC	jjanec@nhsc.edu	701-627-8049

Jen Janecek-Hartman	NHSC	jjanec@nhsc.edu	701-627-8049
Melody Azure	SBC	melody.azure@sittingbull.edu	701-854-8020
Terri Martin-Parisien	TMCC	tmartinparisien@tm.edu	701-477-7862 ext. 2961
Charles Gitter	UTTC	cgitter@uttc.edu	701-2558-3285 ext. 3101

[Click here to email everyone](#) on the above list.

[Director of Academic Affairs](#)