



INDUSTRIAL TECHNOLOGY- MINING EMPHASIS COURSE DESCRIPTIONS

Industrial Technology- Semester 1: Fall 1st year Courses

IMRT 1216- Industrial Orientation: (lecture 2 credits)

The course will provide an overview of and introduction to the taconite industry. It will encompass the various jobs within industry and taconite production. Workers' rights and responsibilities in an industrial environment will also be discussed. Plant/site visits are included, along with guest speakers and industry and safety experts. Where Northeast Minnesota's iron ore pellet production fits into the global economy will be discussed. Keys to future job securing and success of mining in and other industries in Minnesota will be studied and discussed.

ITSF 1486 - MSHA New Miner Training: (lecture 1 credit + 8 hrs on site)

24 hours of above-ground mining safety, accident avoidance, workers responsibilities and rights that is required by the US Department of Labor's Mining Safety and Health Administration (MSHA).

CSCI 1455 – Introduction to Computers (lecture 3 credits)

Introduction to the use of the personal computer (PC) including overview, use of the internet, email, and Microsoft software applications. Projects to develop students skills in MS Word, Excel, Powerpoint, and Access. Focus is on practical applications and using the PC as a tool. Overview of other computer systems and logic, such as the components of a generic electronic control unit.

MATH 1511 - Foundations of Math (lecture 3 credits)

This course is the study of mathematics with emphasis on sets, logic, number theory, and mathematical systems. This course is tailored for IT students to include practical applications of these concepts. Additionally, algebra, geometry, and right angle trigonometry will be taught in the context of providing the math tools needed to solve problems in industry.

OR- MATH 1521 -College Algebra (lecture 4 credits)

This study of Algebra includes: real numbers, first degree equations, and inequalities with word problem applications and linear graphs, second degree equations, and inequalities in one and two variables with the quadratic formula and graphs, relations, functions, absolute value, variation problems, exponential and logarithmic functions with applications, polynomial functions, the theory of polynomial equations and complex numbers, systems of equations and inequalities, conic sections, and partial fractions.

WELD 1221 – Intro. To SMAW (lecture 1 credit)/ WELD 1222 – Basic SMAW Skills (lab 2 credits)

The purpose of this course is to introduce the student to the Shielded Metal Arc Welding Process and the related safety practices through National Skills Standards established by the federal government and the American Welding Society. The student will become familiar with safety standards, metallurgy, electrical principles, and filler metals and how to apply them to all weld types in all welding positions. Welding terminology and typical job communications will be covered. The purpose of the lab is to build skills in welding mild steel using E6010 and/or E6011 electrodes with the Shielded Metal Arc Welding Process. The student will use SMAW principles and techniques, practical safety standards, and filler metals and how to apply them via lot of in-lab practice. Students will be evaluated on their performance in a work-like environment.

IMT 1238 – Rigging (1 Lec; 1 Lab; 2 Cr total)

This course covers rigging equipment and procedures along with mobile crane instruction and operation. Estimation skills along with proper hand signals will be learned

IMT 1241 – Basic Blueprint Reading & Sketching: (1 Lec; 2 Lab; 3 Cr)

This course will give the student the opportunity to put into practice the knowledge obtained in previous classes. The student will make sketches including all areas of blueprint reading and sketching. Through the use of industry prints, the student will gain comprehensive knowledge of their use in industry

Industrial Technology- Semester 2: Spring 1st year Courses

Introduction to Industrial Maintenance - IMRT 1215: (lecture 3 credits: hands-on integral to lecture)

The purpose of this course is to introduce the student to the field of industrial maintenance. The course will provide a foundation upon which courses in year two of the Industrial Technology Program will be built. Students will learn the fundamentals of bearings, lubrication, machine safety, and rigging. Students will be exposed to mechanical devices such as measuring tools, common hand tools, common power tools and the fundamentals of pumps and valves. Students will demonstrate predictive maintenance principles prior to the specialized training.

Electrical For Operators - EIAT 1255: (lecture 2 credits + 1 lab credit = 3 total credits)

This course provides a general knowledge of industrial electrical systems. It encompasses topics starting with basic electrical theory and continues with electrical safety, electrical distribution systems, and motor control. The course focus is on practical knowledge needed by multiple craft and operation personnel.



Mobile Equipment Maintenance - ATMX 1265: (lecture 3 credits: hands-on integral to lecture)

This course will help the student understand how mobile equipment is to be serviced and maintained. It will explain servicing programs, preventative maintenance and equipment pre-checks. It will help students understand why mobile and plant equipment needs to be maintained.

Drive Components and Troubleshooting - IMT 1256: (lecture 2 credits + 1 lab credit = 3 total credits)

The main purpose is to introduce the student to drive components and equipment operation. The student will learn the how and why of checking equipment before, during, and after operation. The student will also learn about the set-up, maintenance, and troubleshooting of many of the drive components which are used in industry.

Industrial Technology- Semester 3: Fall 2nd year Courses

PHYS 1451 Applied Physics – New course

The focus of the physics course will be the understanding of basic physical principles and laws, with applications drawn from various areas of IT (rigging, electricity and magnetism, heat transfer, Newton's Laws, etc.). The goal is the develop students who have a reasonably deep understanding of *why* things work, as well as *how* they work.

SPCH 1550 – Intro to Communication (Lecture 3 credits)

Introduction to communication and speech. Emphasis is to improve the efficiency of communication in an industrial setting.

EIAT 1256 – Process Control for Operators – New Course (2 Lec; 1 Lab; 2 Cr)

The focus will be understanding quality measurables, process control (including statistical process control), manufacturing processes and instrumentation/measuring. Hands-on labs will accompany the lecture, and reinforce/demonstrate topics presented in lecture.

HLTH 1486 - MSHA Refresher/Fire Safety & Response (1 credit)

Refresher/addition training on mine safety, accident avoidance, workers responsibilities and rights that is required by the US Department of Labor's Mining Safety and Health Administration (MSHA).

IMT 2261 - Hydraulics and Schematics (or IMT 2262 - Pneumatic & Hydraulics Troubleshooting upon consent of instructor)

(1 Lec; 2 Lab; 3 Cr). This course covers the fundamentals of schematic diagrams. It is designed to provide the student with a strong foundation for advanced work. The student will learn piping diagrams and fluid power diagrams. The student will study fundamental hydraulic principles. They will construct, service and repair various hydraulic systems.

GEDC 2175 – Job Search Strategies

Skills and techniques to find and be successful in a full-time job are taught

Industrial Technology: Spring 2nd year Courses

ENGL 1532 - Tech Report Writing (3 credits) or ENGL 1511 College Writing (4 credits)

Courses are designed to improve written communications of technical material, or provide college-level writing skills for transfer credit to a 4 - year program.

IMT 1245 – Lube & Bearings (1 Lec; 2 Lab; 3 Cr)

The main purpose of this course is to introduce the student to both lubrication and bearings. The lubrication portion will take the student from the beginning source of a lubricant right up to the selection and design of an automatic lubrication system set-up and operation. The bearing portion will allow the student to identify types of bearings and seals, and to know what functions they can expect from them, as well as proper mounting, operation, and inspection of them as is found in a variety of industries

PSYC 2556 – Industrial Psychology (4 credits)

This course is included to help students understand behavior in industrial environments, and gain insights into how to effectively develop attitudes and behaviors necessary to ensure a safe and efficient operation, and openness to new ideas and change. Topics include a discussion of the mentality needed for continuous improvement and proactive process optimization.

IMT 2265 – Alignment & Introduction to Conveyor Systems (1 Lec; 2 Lab; 3 Cr)

(1 Lec; 1 Lab; 2 Cr) This course is intended to provide the basis for the study course using models that are designed for “hands-on” learning with actual systems that are used in industry. This course will cover precision machine component alignment procedures. The student will also be introduced to conveyor and material handling systems and their applications



IMT 2225 – Pumps (1 Lec; 1 Lab; 2 Cr)

This course describes the types of pumps and explains their operation and maintenance. It also tells about the packing, sealing, and lubrication, all of which are essential to good pump operation. Students will be given an opportunity to develop and practice pump maintenance skills in a lab setting.

IMRT XXX - Production Technician Certification (2 credits)

Overview course to prepare students for the Manufacturing Skill Standards Council (MSSC) certification exams in the areas of safety, maintenance, manufacturing processes, and quality.

IMRT YYY: ZZZ Processing Of Ferrous And Non-Ferrous Metals

The focus of this course would be a moderately detailed study of the processes and equipment used in taconite mining / iron ore pellet production, as well as a general study of other mining techniques and processes (ferrous and non-ferrous). Other topics will include an analysis of the steelmaking process (integrated steel mills and mini-mills), Precious metal mining (such as those that may be used by Polymet and Franconia Mineral), critical competitive issues, quality issues, geology, as well as environmental issues. This course will be open to all technical students, pre-engineering students, and hopefully new/upgrading employees currently employed in mining/mineral processing. It will be taught instructors at MRCTC, as well as industry experts.