# King Saud University
## College of Applied Medical Sciences
### Biomedical Technology Department

**BMT221: Basic Mechanical Skills 3 (1-2-0)**

**Current Instructor:** Eng. Mohammad Zarrar Sharif, Eng. Emad Ameen and Dr Mohamed Z. Bendjaballah
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**Textbook(s) and/or Other Required Materials:** SolidWorks 2001: Getting started, free eBook

**Extra references:** ***Geometric and Engineering Drawing,*** Keneth Morling, Elsevier, 2010 (3rd edition)

**Course Description (catalog):** This course covers an introductory material to engineering drawing including the principles of projection and theory of auxiliary projection and its applications (true shape, true length). Plane sections of solids and auxiliary views of geometrical bodies, development of solids, orthographic views for given models and pictorials is also to be covered. Topics on the pictorial drawings (oblique and isometric), sectional views from pictorial views are similarly addressed. Implementation of the theoretical drafting techniques when using computer assisted design software (SolidWorks from the Solidworks Corporation and Structural Research & Analysis Corporation) through the manipulation of part, assembly and drawing documents.

**Prerequisites:** None
**Co-requisite:** None
**Course Type:** Mandatory

**Course Learning Outcomes:** The global content of the course will help student:

- Understand the field of engineering drawing and descriptive geometry, the graphical languages of industrial technology
- Create detailed orthographic drawings from parts and assemblies using 1st and 3rd angle of projection.
- Develop a capability of both hand sketching and computer aided drawing in engineering area to allow manufacturing of simple machine components.
- Assemble various parts through appropriate mating conditions in addition to creating collapsed and exploded views of assemblies. Create motion path, detect collision and interference and correct the design accordingly for small mechanisms and systems

**Student Outcomes Covered by Course:**
a. an ability to select and apply the knowledge, techniques, skills, and modern tools of biomedical technology to include the application of circuit analysis, analog and digital electronics, microcomputers, biomechanics, biomedical instrumentation systems, and safety in the building, testing, operation, and maintenance of biomedical equipment.
Students apply knowledge and skills of engineering drawing and descriptive geometry to engineering design process. They develop a skill of using proper engineering drawing techniques and CAD features for adequate representation of engineering parts and assemblies. They are able

to achieve the 3D solid parts with least number of features and convert them into 1st or 3rd angle orthographic projections

b. an ability to select and apply a knowledge of mathematics, chemistry, physics, and biological sciences, engineering, and technology to building, testing, operation, and maintenance of biomedical equipment and the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of biomedical systems.

c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
In laboratory, students develop capabilities in both hand sketching and computer aided drawing in engineering area through understanding engineering visualization principle, projection theory, and their applications in engineering drawing

d. an ability to analyze, design, and implement biomedical systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives.
Students are able to design simple system components, combine them in assemblies using proper mating conditions, detect possible interference between parts and make the necessary design modifications to meet the functional requirements of the system. They get used to utilize basic dimensioning and tolerancing principles to get their parts ready for manufacturing process

e. an ability to function effectively as a member or leader on a technical team.

f. an ability to identify, analyze, and solve broadly-defined biomedical technology problems.

g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.
Acquire skills on how to use graphical communication in technical field through engineering drawing, descriptive geometry and 3D solid modeling which represent the only graphical languages of industrial technology

h. an understanding of the need for and an ability to engage in self-directed continuing professional development.
Most of the students do engage in a self-directed continuing development of their skills in 3D solid modeling by using the software either on campus or by buying affordable student licenses available from a local representative of the Solidworks Company.

i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.

j. a knowledge of the impact of engineering technology solutions in a societal and global context and an understanding of the clinical application of biomedical equipment.

k. a commitment to quality, timeliness, and continuous improvement.

**Major Topics covered and schedule in weeks:**
1. Basic functionality and characteristics of the software
2. Basic sketching, assembly fundamentals and drawing principles
3. Basic dimensioning and tolerancing
4. Extrude, revolve, sweep and loft features and cut features
5. Advanced assemblies and animation techniques
6. Different types of drawings: pictorial, perspective, isometric, and oblique
7. Orthographic Projections: 1st & 3rd angle of projection