
Medical Informatics and Biostatistics

Sorana D. BOLBOACĂ, Ph.D., M.Sc., M.D., Lecturer

"Iuliu Hațieganu" University of Medicine and Pharmacy, Cluj-Napoca
Department of Medical Informatics and Biostatistics

OUTLINE

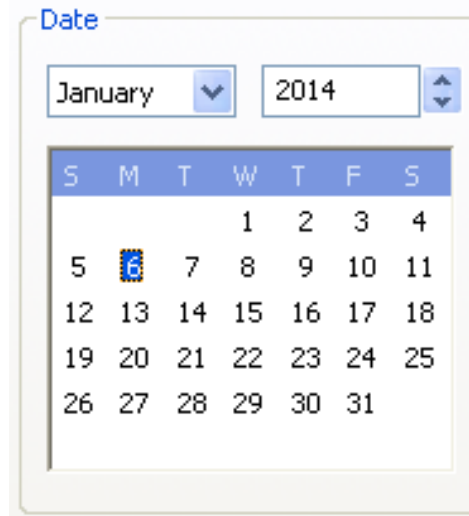
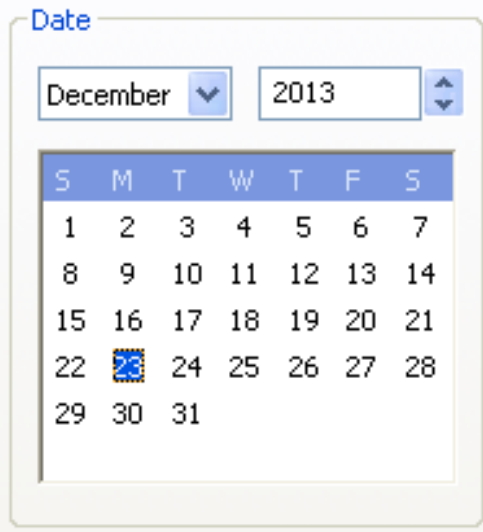
- PRESENTATION
- OBJECTIVES
- RULES AND REGULATIONS
- ABOUT EXAM
- SUBJECTS AND SCHEDULES
- WHAT ABOUT?

PRESENTATION

- Course: 1 hour / week
- Practical activities: 2 hours/week
- When ?: 1st semester, 1st year of study
- Exam Sessions
 - 1st : January 20th, 2014 – February 14th, 2014
 - 2nd: June 9th – July 4th, 2014
 - 1st Re-taken: July 14th – July 18th, 2014
 - 2nd Re-taken : July 24th – July 30th, 2014

HOLIDAYS

- December 23rd 2013 – 3rd January 2014:
Christmas holiday



- February 17th – February 21st 2014: winter holiday

PRESENTATION

- Contact: sbolboaca@umfcluj.ro

- Preliminary conditions:

- Arithmetic knowledge

- Gilmore CK, McCarthy SE, Spelke ES. Symbolic arithmetic knowledge without instruction. *Nature* 2007;447:589-591.

- Web pages:

- <http://www.info.umfcluj.ro/index.php/en/>

- <http://sorana.academicdirect.ro/pages/students.php>

PRESENTATION: Faculty of Medicine

- Course: **Monday 9-10**
- Practical activities:

Group	Teacher	When?
1	Dr. Sorana D. BOLBOACĂ	Wednesday 8-10
2	Dr. Sorana D. BOLBOACĂ	Wednesday 8-10
3	Dr. Tudor CĂLINICI	Wednesday 8-10
4	Dr. Tudor CĂLINICI	Wednesday 8-10
5	Dr. Sorana D. BOLBOACĂ	Monday 10-12
6	Dr. Sorana D. BOLBOACĂ	Monday 10-12
7	Dr. Mădălina A. VĂLEANU	Monday 10-12
8	Dr. Tudor CĂLINICI	Monday 10-12

PRESENTATION: Faculty of Dentistry

- Course: **Monday 13-14**
- Practical activities:

Group	Teacher?	When?
1	Dr. Tudor CĂLINICI	Monday 14-16
2	Dr. Cosmina I. BONDOR	Monday 14-16
3	Dr. Cosmina I. BONDOR	Monday 14-16
4	Dr. Sorana D. BOLBOACĂ	Monday 14-16
5	Dr. Sorana D. BOLBOACĂ	Monday 14-16

GENERAL GOALS

- To help students to gain
 - basic information about information technologies with applications in medicine / dentistry
 - basic methods of statistics in medical / dental practice and research

THEORETICAL KNOWLEDGE

- What is need to know?

- Elements of information theory.
- Data structures. Models and systems for information management.
- Probabilities and their applications.
- Statistical methods and their applications.

SKILLS - What students know to do?

- Microsoft Word processing.
- Collecting data; data management with Microsoft Excel.
- Statistical analysis with Microsoft Excel & EpiInfo.
- Data communication using Microsoft PowerPoint and Microsoft Word.
- Searching and accessing information using the Internet.

PRESENTATION: MATERIALS

- ❑ Courses
- ❑ Practical activities
- ❑ Supplementary Materials & Homeworks
- ❑ Reading materials
- ❑ Other bibliography:
 - Sorana BOLBOACĂ, Horațiu COLOSI, Tudor DRUGAN, Andrei ACHIMAȘ, Ștefan ȚIGAN, Elements of Medical Informatics and Biostatistics, SRIMA Publishing House, Cluj-Napoca, Romania, 211 pages, 2003, ISBN 973-85285-0-X.
 - Bernard ROSNER, Fundamentals of Biostatistics, any edition.
 - Robert H. RIFFENBURGH, Statistics in Medicine, any edition.

UNIVERSITY POLICY

Chapter IX.

Professional activity. Attendance

Article 53. The student's professional activity in the University is represented by:

- courses
- practical work
- seminars
- clinical placements
- individual study
- tutoring
- portfolio, etc.

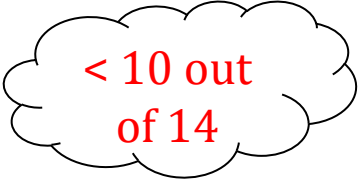
- Article 54. Attendance to practical activities (internships, tutorials, seminars) is mandatory.
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UNIVERSITY POLICY

Article 55. (1) The practical activity program must be entirely accomplished by the students. No unexcused absences are allowed to practical work/internships.

(2) Each academic subject establishes its own make-up work possibility.

(3) At the beginning of every academic year or semester (for semestrial subjects), each academic subject displays the possibility of make-up work for practical activities/internships.

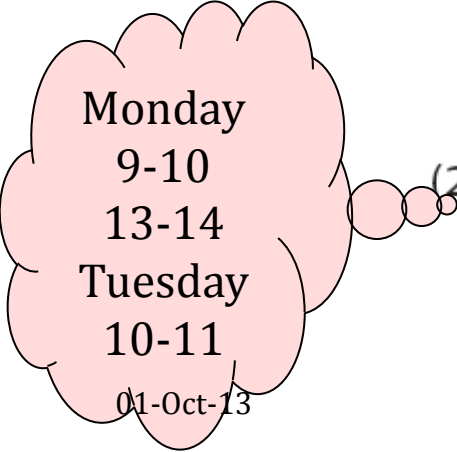


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of 14

Article 56. To earn all the credits allocated for an academic subject, students must attend at least 70% of the subject's course hours.

Article 57. (1) Absences that exceed 30% of the entire subject's course hours have, as a consequence, the student's exemption from the exam during the corresponding exam session and the loss of an opportunity to take the exam.

(2) Make-up work for absences at course hours can only occur within the same week, with another series, if possible, and without disrupting the regular teaching activities. There are no fees for absences at course hours.



Monday
9-10
13-14
Tuesday
10-11
01-Oct-13

UNIVERSITY POLICY

Article 58. Absences due to serious medical or family problems must be excused and made-up for.

Article 59. (1) Absences due to particular situations:

- blood donation
- taking part in collective research within university or faculty activities
- student scientific events
- volunteering for SMURD
- other special circumstances, excused in terms of university interests

must also be excused and made-up for.

- (2) In order to excuse an absence, the student must submit a request at the faculty's Dean's office, before the absence.
- (3) Students may have absences only with the Dean's office approval.
- (4) Make-up work for absences due to blood donation or activities at SMURD is done without any additional fees.

UNIVERSITY POLICY

- Article 60. (1) For exceptional circumstances due to personal events (marriage, death in the family), students may be absent from the teaching activity for a maximum period of 5 working days and absences may be excused.
- (2) For absence excuse, the student must submit a request to the Dean's office, accompanied by supporting documents.

- Article 61. (1) Absence excuse is the attribute of the faculty's leadership, based on supporting documents and individual request submitted at the faculty's office of the secretary.
- (2) Submission of supporting documents at the Dean's office must occur no later than 10 (ten) working days after the student's return to the didactic activities.
- (3) If submitted later, documents will not be taken into account and any related absences will be unexcused.

Article 62. The excuse of medical absences which sum up more than 14 consecutive days requires a hospital discharge ticket or a certificate endorsed by a chief of a hospital department, or a medical commission established by the university's leadership.

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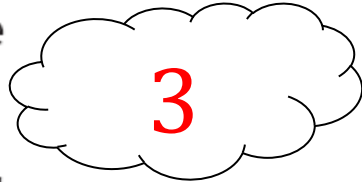
Article 63. Medical motivations issued by other institutions than the University's medical office are endorsed by the University's medical office before submission to the Dean's office.

Art 64. Absence excuse can only be based on a certificate issued by the faculty's Dean's office.

Article 65. (1) A student is allowed to make-up for up to 20% of the practical activities in an academic subject.

(2) Absences exceeding 20% of all practical activities determine the complete resumption of the studies in that academic subject.

Article 66. Excused absences which cannot be made-up for during the semester, within the scheduled activities, and which require additional classes in certain academic subjects, are made-up for with an additional fee in accordance with the provisions in the "Tuition fees" Annex.



UNIVERSITY POLICY

Article 67. (1) The following situations represent exemptions from the provisions of article 66 are:

- polytrauma,
- fractures,
- infectious and contagious diseases,
- hospitalization in university clinics in Cluj-Napoca
- exceptional family problems.

(2) Special cases are analyzed by the Board of the Faculty Council on the student's request of an appointment.

Article 68. According to Article 61 (2), unexcused absences, with no acceptable motivation or with a delayed motivation submission, are made-up for only after payment of the fees set out in the "Tuition fees" Annex.

Article 69. Not making-up for all absences automatically determines the student's exemption from the exam until making-up for all absences.

UNIVERSITY POLICY

Chapter X. Performance evaluation. Examination

A. General provisions

Article 70. (1) Examination rules must be known and obeyed throughout the entire academic community.

(2) Recommended methodologies for the implementation of this regulation chapter are contained in Annex 7 (Procedures)

Article 71. The examinations are carried out in Romanian, English or French for the tuition programs taught in those languages, in the years of study when, in accordance with the Student Agreement, the classes are conducted in a foreign language.

UNIVERSITY POLICY

- Article 73. (1) Exams consist of two tasks: theoretical and practical.
- (2) practical exams are conducted according to the subject's peculiarity.
 - (3) practical exams must include an oral part in all clinical disciplines.
 - (4) written exams may be held in the form of multiple choice tests, or text redaction or mixed (multiple choice + text redaction).
 - (5) for text redaction tasks, task assignment is done by drawing lots.
 - (6) theoretical examinations are conducted in the presence of at least two teachers: the main course teacher or a person delegated by him/her and the teacher who conducted the practical work/clinical internships or a substitute teacher appointed by the head of discipline.

UNIVERSITY POLICY

B. Conditions regarding the student's submission of exams

Article 75. Exam submission is subject to attending all practical works, internships and make-up work, according to Articles 55-59, 65-69.

Article 76. (1) Only enrolled students can submit an exam in the University.
(2) Exam admission occurs only after the inspection of the student exam card issued by the Dean's office, which officially attests student's status and up-to-date fulfillment of all financial obligations

Article 77. (1) Exam admission occurs only after verifying the students' identity based on a valid ID (passport or identity card) and on the student report card endorsed by the Faculty's office of the secretary.
(2) Exam admission is subject to compliance with preliminary conditions of preparation (pre-requisites).

Article 78. Students are allowed to attend the examination for a specific discipline only once per each examination session.

UNIVERSITY POLICY

- Article 79. (1) Students are allowed to attend the examination for a specific discipline no more than three times during an academic year.
- (2) The curriculum includes four examinations sessions for the linear tuition program: the winter session, the summer session and two reexamination sessions.
- (3) In case of linear tuition program, students can attend the exam as follows:
- the first submission in the examination session occurring at the end of the course;
 - the second submission in the next examination session: the summer session if there will be an exam in that academic subject (for subjects with examination in the winter session) or the first reexamination session.
 - the third submission in the second reexamination session.

UNIVERSITY POLICY

- (5) Absence or non-admission to an examination until the end of the semester or module, results in the loss of one possibility of taking that exam.
- (6) In this regard, absence from an exam scheduled for that series, without duly justified reasons approved by the Council Board of the Faculty, results in the loss of one opportunity of taking that exam, therefore diminishing the number of possible submissions.
- (7) Non-admission to an exam due to absences during the semester/module has the same result, diminishing the number of possible submissions.
- (8) Students who have an excuse for their absence from the examination, approved by the Council Board of the Faculty, benefit from all the possibilities to submit that examination.

Article 80. The exams from the second reexamination session are held in the presence of a commission made of three teachers appointed by the head of the academic subject.

Article 81. In order to earn the remaining credits, the exam for a given academic subject can be submitted three times in one academic year.

UNIVERSITY POLICY

D. Exam progress

Students' obligations

Art. 98. Students must arrive at the exam's time and place as scheduled.

Art. 99. For written exams, students are distributed in examination classrooms according to the supervising teacher's decision.

Article 100. Students come to the exam with their student report card (or temporary certificate from the Dean's Office) and their ID (or passport). On entering the examination classroom, the examiners identify the students based on these documents.

Article 101. Taking an exam for another student is a fraud; it is prohibited and punished by expulsion of both students (the student who replaced another one and the student who was replaced).



AND

UNIVERSITY POLICY

Article 102. (1) Bags, outdoor clothes and mobile phones are stored in the locations specified by the supervising teachers and not near to the students.

(2) Cell phones must be turned off when entering the examination classroom and stay that way throughout the examination; they can only be turned on again after leaving the examination classroom.

(3) During the exam, students are not allowed to carry cell phones or other electronic devices enabling interpersonal communication and information access.

Article 103. (1) Students must carry a pen or pencil and other admissible stationery necessary for exam submission.

(2) Any request or question can only be addressed with a loud voice only to the supervising teachers.

Article 104. The papers, including drafts, or the grid forms distributed by the teachers must be used only if signed by the teacher.

Article 105. During the examination, communication between students is forbidden.

UNIVERSITY POLICY

Article 106. During oral exams, students have 20 minutes to think about their topic and no more than 20 minutes to sustain their exam.

Article 107. For any type of exam, the last three students must stay in the classroom until the examination of all students is completed.

Article 108. (1) On leaving the classroom, students must hand the written papers and all their signed sheets.

(2) Upon completion of the written exam, students must sign for the delivering of their written paper.

Teachers' obligations

Article 109. During written exams, students are supervised by at least two teachers.

Art 110. Teachers participating in the examination must identify students by means of their ID and check if their identity corresponds with that of their report card and exam card issued by the Dean's office.

UNIVERSITY POLICY

Article 111. The resident teacher is responsible for the assurance of the exam's unfolding conditions, so that students benefit from the best academic environment throughout the examination.

Article 112. Supervising teachers must have an appropriate attitude in order to discourage any attempt of fraud. The course resident teacher and the head of the department are directly responsible for this aspect of academic ethics.

Article 113. The effective duration of the exam is written by the teachers on the blackboard.

Article 114. For multiple choice written exams, the course resident teacher must communicate the correct answers at the end of the written examination.

UNIVERSITY POLICY

E. Exam promotion

Article 115. Examination assessment must be objective and reproducible and characterize the student's professional performance.

Article 116. (1) Student knowledge assessment is noted from 1-10.

(2) A discipline is promoted when the final mark, from both theoretical and practical exam, is at least 5.

(3) Marks below 5 bring about the student's reexamination in the exam task he/she did not promote, in a future session.

(4) When the results are known, not promoting the first task of the exam (theoretical/practical) means that the student will not be allowed to take the next task.

(5) If the student takes the first task of the exam but is absent from the second, he/she gets the minimum score and is declared failed.

Article 117. (1) At the beginning of every academic year, all the departments display the student's exam admission criteria and how the final mark is calculated, respectively the weight of both exam tasks.

(2) It is mandatory that both theoretical and practical exam tasks have a weight in the student's final mark.

UNIVERSITY POLICY

Article 119. (1) By promoting the exam the student earns the number of credits allocated to the respective subject.

(2) The number of credits allocated to a subject is not divisible.

Article 120. (1) Exam results are communicated to students straight away (for oral exams) or up to seven days for the written exams and are listed in the exam card and in the student's report card.

(2) The exam card is filled up, signed and sealed with the department's stamp and then submitted to the office of secretary of the faculty no later than the next day after result communication.

(3) The head of the department is directly responsible for the security of the exam card's transfer to the Dean's office.

(4) Exam results are displayed at the department's office.

Article 121. (1) The students have the right to see their paper and receive explanations regarding the scoring.

(2) In this respect, the course resident must set a timeframe when students can see their paper, period which must not exceed two working days from the communication of the results.

UNIVERSITY POLICY

- Article 122. (1) The students who, after a thorough analysis of their work, believe that they were aggrieved can dispute the result.
- (2) Student appeal can only regard own results.
- (3) Student appeal regarding the way the exam was conducted, the scoring or exam results are submitted to the Office of Secretary of Faculty within 48 hours after the results publishing.
- (4) Appeal result is given in writing to the student, the concerned teacher and the head of the department, within seven days after its submission.
- (5) If indisputable evidence shows that the examination was conducted illicitly or that the student was aggrieved, the Board of the Faculty Council can invalidate the exam result and ask for a further examination by a commission approved by the Board of the Faculty Council, made of three teachers (mandatorily including the head of the department), in accordance with the examination procedures foreseen for that academic subject.
- (6) In these circumstances, the reexamination does not diminish the total number of possible exam submissions in order to promote the exam.
-

UNIVERSITY POLICY

F. Reexamination for higher marks

Article 124. Reexaminations for higher marks are conducted with the approval of the Board of the Faculty Council, and they must abide by the following principles:

- (1) a reexamination for a higher score can only be applied for promoted exams;
- (2) during the tuition program, the maximum number of possible reexaminations is equal to the double number of the years of study from the tuition program the student is enrolled in.
- (3) in one academic year, there can be no more than 2 reexaminations for a higher mark;

Article 125. (1) In order to request a reexamination, the student must have no remaining credits (he must have earned all the course credits).

- (2) the status of a student who has earned all the course credits is established at the end of each examination session and is valid starting from the next session.

UNIVERSITY POLICY

Article 126. The reexamination takes place in the presence of a commission made of three teachers and appointed by the head of the department.

Article 127. The reexamination for higher marks is submitted in the first or second reexamination session.

Article 128. (1) The new mark obtained during the reexamination is final and written in the enrollment sheet, no matter if it is lower or higher than the initial one.

(2) the new mark is part of the annual arithmetic mean.

Article 129. The reexamination presumes a fee which is stipulated in the "Tuition fees" Annex.

UNIVERSITY POLICY

G. Liability and penalties

Article 130. Failure to keep discipline during the exam brings about the student's exclusion from the exam.

Article 131. Attempted fraud and fraud during the exam will be punished, regardless of the way it was committed: direct communication, presence of written materials, electronic communication devices, student substitution etc.

- Article 132. (1) Detection of electronic devices which can communicate or look for information during the exam is considered attempted fraud, even if the student did not use the device.
- (2) Students with hearing disorders who need to use hearing aids must notify the course resident teacher about this situation at least 72 hours before the exam.
 - (3) The course resident teacher is entitled to request medical documentation proving the student's need to use a hearing aid.
 - (4) The course resident teacher can decide that these students should take an oral exam.

UNIVERSITY POLICY

Article 133. Students caught in the act of committing fraud or attempted fraud are immediately excluded from the exam.

Article 134. (1) Attempted fraud or fraud detected by the supervising teacher is recorded in a written report, elaborated by the teacher with the highest teaching degree in the examination room
(2) The written report is signed by all present teachers and by those who committed the fraud or the attempted fraud.
(3) If they refuse to sign, the refusal is mentioned in the report.
(4) The written report is submitted to the Dean's Office within 24 hours from its elaboration or in the first working day (for exams conducted on Fridays or in the weekends) and is discussed by the Board of the Faculty Council.

Article 135. Before suggesting the student's punishment of expulsion, the Board of the Faculty Council has the obligation to listen to both the teacher ascertaining the fraud and the student involved.

UNIVERSITY POLICY

- Article 136. (1) The penalties suggested by the Board of the Faculty Council should be subject to approval by the Faculty Council and implemented by competent authorities.
- (2) The sanctions are provided in Chapter 15.

- Article 137. (1) Students have the right to inform regulation breach, whether it concerns the teachers or other students.
- (2) If students detect attempted fraud or fraud during the exam, they must inform teachers immediately.
- (3) If a teacher violates the examination rules, the intimation is done in writing, within 48 hours from the infringement or in the first working day (if the infringement occurred in the weekend).
- (4) The intimation is addressed to the Board of the Faculty Council and submitted to the Dean's Office within the time-frame specified in paragraph (3).
- (5) The intimation is analyzed by the Board of the Faculty Council.

UNIVERSITY POLICY

Chapter XI.

Complementary year. Medical extension of the tuition program. Credits in advance

- Article 138. (1) Students who did not earn the minimum number of credits necessary in order to promote a year of study (45 credits) can continue the studies in a complementary year.
- (2) The complementary year extends the total length of the tutorial program.
 - (3) The complementary is a repeating year with the possibility of obtaining credits in advance.

- Article 139. (1) During the studies, a student can be enrolled in a complementary year for not more than three times.
- (2) The student must finish the studies within a period which does not exceed the double of the normal tuition length for the major he/she is enrolled in.
 - (3) Failure to comply with the provisions of paragraphs (1) and (2) of this article is followed by expulsion.

DEPARTMENT POLICY

- No change in the planning of the lab classes is allowed.
- The absences to the practical classes are motivated in maximum 2 weeks from their respective date (the health certificate is issued by the Dean's Office). The certificate is submitted to the group assistant in a copy together with the original.
- The group assistant is allowed to expel students that have other preoccupations than the lab class content. In these cases the student can't recuperate that lab with a medical certificate.
- The absences can be recuperated only after the health certificate or the bill showing the payment of the classes left is submitted in term of 2 weeks from the date of the absences.

DEPARTMENT POLICY

- The lab classes are recuperated in the planned framework provided by the group assistant. No permission is given to recuperate classes with other teaching staff.
- Students that have absences at more than 20% of the total number of lab hours will have to recuperate the entire module, in the current academic year, or in the following academic years.
- The theoretical and practical exams defended in the same academic year are acknowledged. The students, who pass only one part of the exams, are not obliged to take the exam once again.
- The students who have difference exams should plan the exam with the teacher and also pay the university fee for the exam.

ABOUT EXAM - EXAM POLICY

- Practical exam:
 - To solve given tasks using computer
 - 13th January 2014 (Dentistry)
 - 15th January 2014 (Medicine – gr. 1-4)
 - 13th January 2014 (Medicine – gr. 5-8)
- Theoretical exam:
 - Multiple choice questions
 - Five possible response (A, B, C, D & E);
 - Number of questions: 35
 - To pass an exam: 13.75 points
 - Assessment method ...

ABOUT EXAM - EXAM POLICY

■ Questions with one correct answer:

- 5 concordances = 1 point
- < 5 concordances = 0 point

8) * The following are days of incubation for a contagious disease: 7; 3; 4; 7; 6; 6; 4; 5; 3; 7; 5; 4; 7; 6; 2; 3; 5; and 6. Coefficient of variation is equal to:

- a) 0.32
- b) 0.23
- c) 0.27
- d) 0.29
- e) Could not be calculated based on provided data

■ Questions with 2 correct answers :

- 5 concordances = 1 point
- 4 concordances = 0.5 point
- < 4 concordances = 0 point

16) Let be a statistical series with the following data: 40, 60, 20, 20, 60, 80, 80, 40, 60, and 80. The relative frequency of 0.3 corresponds to:

- a) 20
- b) 40
- c) 60
- d) 80
- e) None is correct

ABOUT EXAM - EXAM POLICY

- Questions with > 2 correct answers:
 - 5 concordances = 1 point
 - 4 concordances = 0.5 point
 - 3 concordances = 0.25 point
 - < 3 concordances = 0 point

7) The following data represent the age of first episode of myocardial infarction on a series of male patients: 38, 50, 23, 45, 70, 33, 25, 40, 50, 62, and 59. The values of quartiles are as follows: $Q1 = 35.5$, $Q2 = 45$ and $Q3 = 54.5$. The following statements are true:

a) $Q2 - Q1 = 9.5$

b) $Q3 - Q2 = 9.5$

c) Data are asymmetrical distributed

d) Data are symmetrical distributed

e) Data are approximately symmetrical distributed

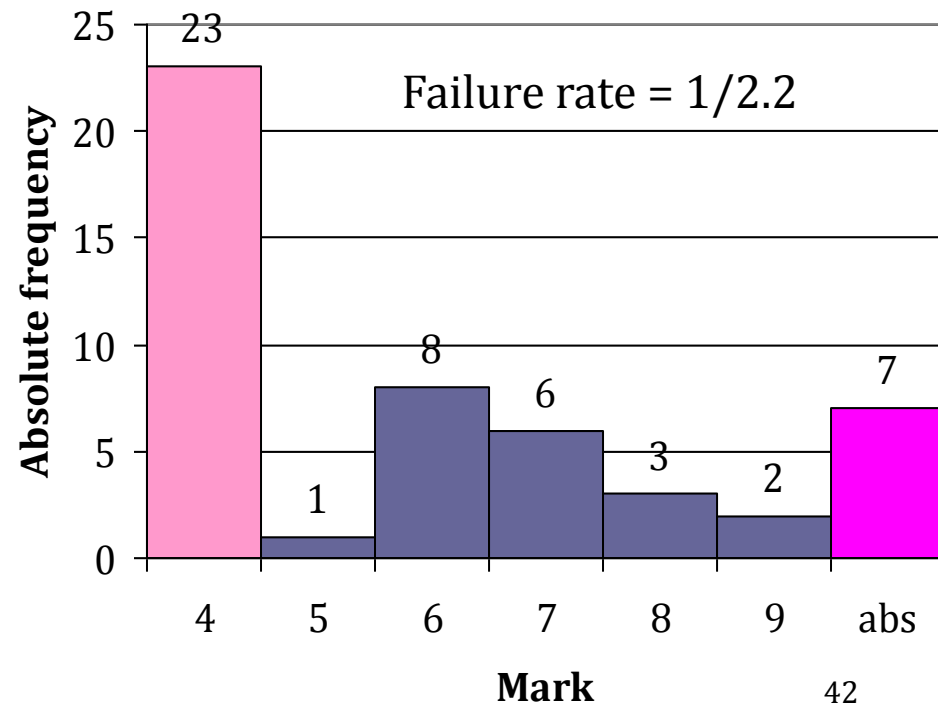
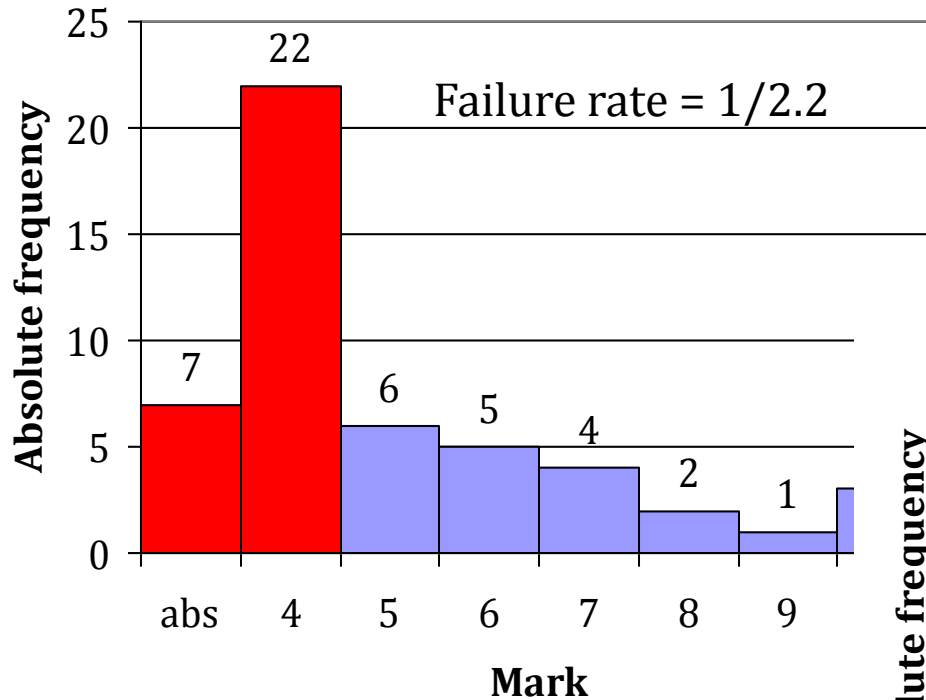
EXAM ATTENDANCE

Winter	Red	White	Pink	Pink	Pink
Summer	White	White	White	White	White
1 st Re-Taken	Red	Pink	Pink	White	White
2 nd Re-Taken	Red	Pink	White	Pink	Pink

PAST EXPERIENCE: PREVIOUS ACADEMIC YEAR

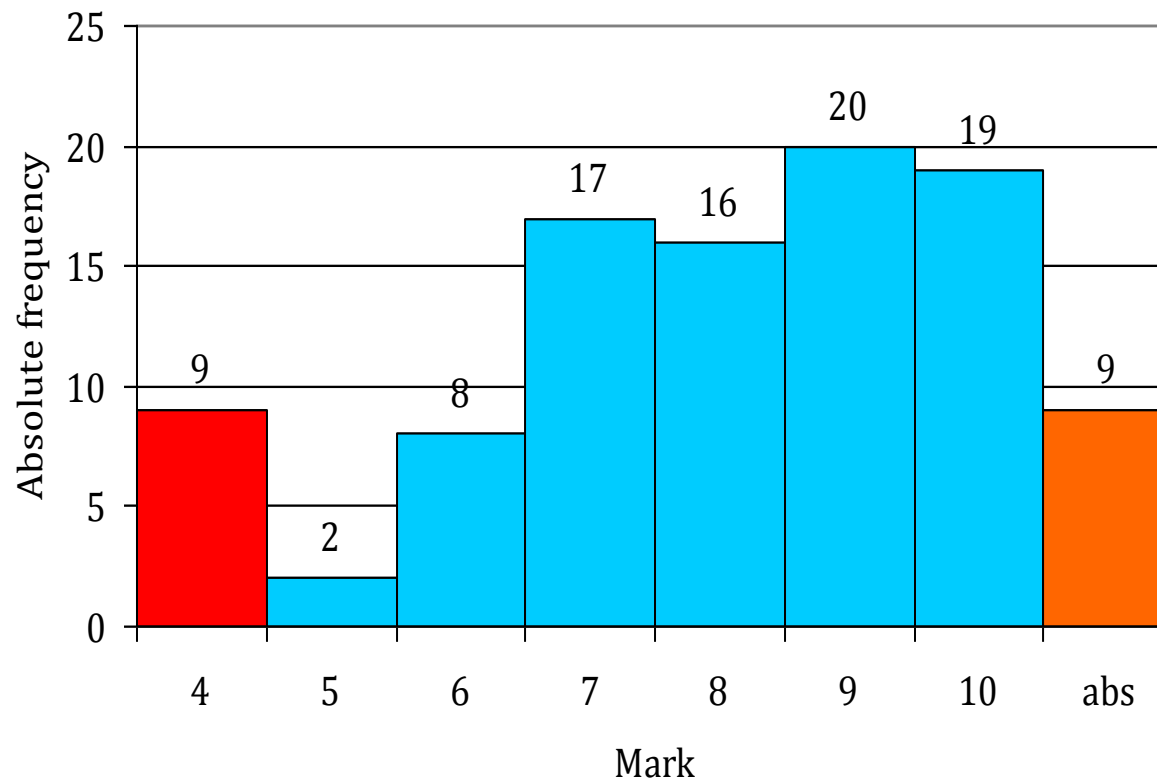
PRACTICAL EXAM - DENTISTRY

FINAL MARK



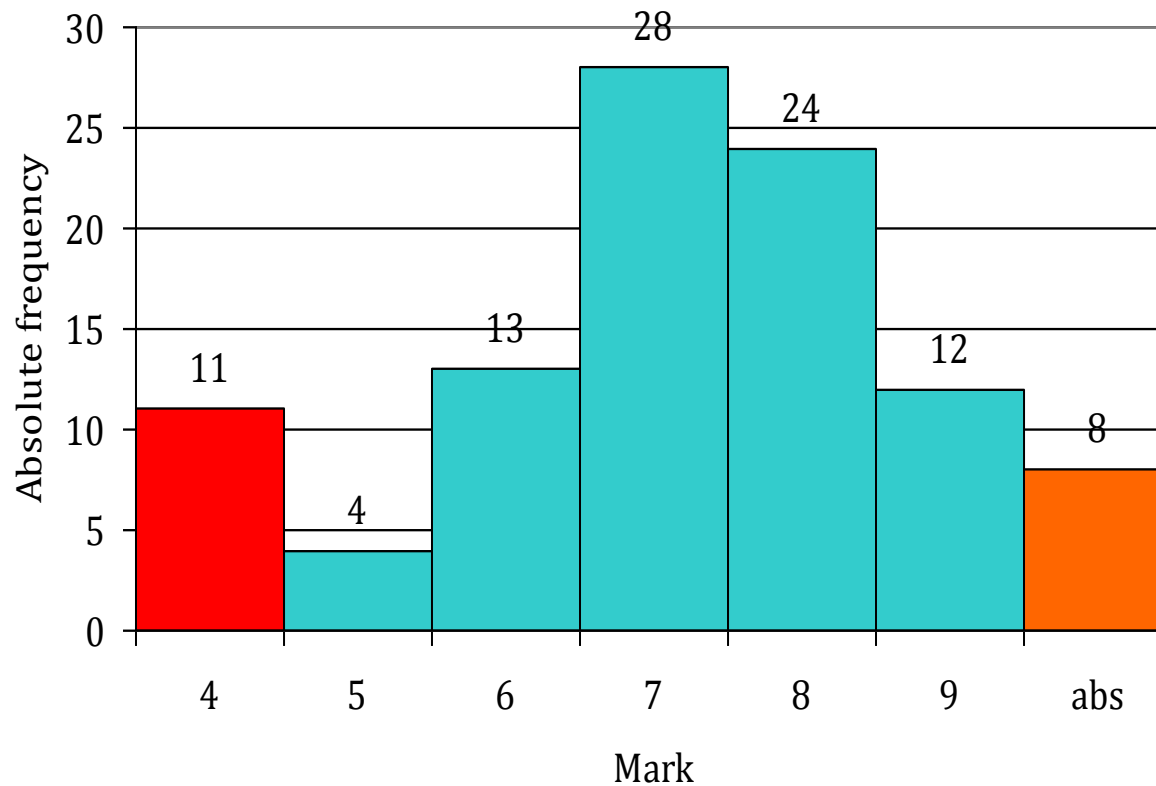
PAST EXPERIENCE:

PRACTICAL EXAM - MEDICINE



PAST EXPERIENCE:

FINAL MARK - MEDICINE



MEDICAL INFORMATICS

- Health informatics, Health care informatics or medical informatics is the intersection of information science, computer science, and health care.
 - Deals with the resources, devices, and methods required to *optimize the acquisition, storage, retrieval, and use of **information*** in health and biomedicine.
 - Health informatics tools:
 - Computers
 - Clinical guidelines
 - Formal medical terminologies
 - Information and communication systems.

MEDICAL INFORMATICS

- **Information science:** interdisciplinary science primarily concerned with the analysis, collection, classification, manipulation, storage, retrieval and dissemination of information.
- **Computer science:** study of the theoretical foundations of information and computation, and of practical techniques for their implementation and application in computer systems.

MEDICAL INFORMATICS

- **Health care:** refers to the treatment and management of illness, and the preservation of health through services offered by the medical, dental, complementary and alternative medicine, pharmaceutical, clinical laboratory sciences (in vitro diagnostics), nursing, and allied health professions. Health care embraces all the goods and services designed to promote health, including “preventive, curative and palliative interventions, whether directed to individuals or to populations”

MEDICAL INFORMATICS

- Electronic medical records
- Health information systems used for billing, scheduling, and research
- Decision support systems
- Standards (e.g. DICOM, HL7) - to facilitate the exchange of information between healthcare information systems
- Controlled medical vocabularies (CMVs):
 - Systematized Nomenclature of Medicine
 - Clinical Terms (SNOMED CT)
 - MEDCIN
 - Logical Observation Identifiers Names and Codes (LOINC)
 - MeSH

MEDICAL INFORMATICS

- European Federation for Medical Informatics
- Health informatics law:
 - legal principles as they apply to information technology in health-related fields
 - Addresses to:
 - ✦ Privacy
 - ✦ Ethical
 - ✦ operational issues
 - ✦ arises when electronic tools, information and media are used in health care delivery.
 - Applies to all matters that involve information technology, health care and the interaction of information.
 - It deals with the circumstances under which data and records are shared with other fields or areas that support and enhance patient care.

MEDICAL INFORMATICS

- **eHealth:** healthcare practice supported by electronic processes and communication.
 - Services:
 - Electronic Health Records: communication of patient data between different healthcare professionals (GPs, specialists, care team, pharmacy)
 - Telemedicine: physical and psychological measurements that do not require a patient to travel to a specialist.
 - Consumer Health Informatics: healthy individuals and patients want to be informed on medical topics.
 - Health knowledge management: e.g. in an overview of latest medical journals, best practice guidelines or epidemiological tracking.
 - Virtual healthcare teams: healthcare professionals who collaborate and share information on patients through digital equipment.

MEDICAL INFORMATICS

- **eHealth:** healthcare practice supported by electronic processes and communication.
 - Services:
 - ✦ mHealth or m-Health: use of mobile devices in collecting aggregate and patient level health data, providing healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vitals, and direct provision of care (via mobile telemedicine).
 - ✦ eHealth Grids: powerful computing and data management capabilities to handle large amounts of heterogeneous data.
 - ✦ Healthcare Information Systems: software solutions for appointment scheduling, patient data management, work schedule management and other administrative tasks surrounding health.

"The purpose of statistical science is to provide an objective basis for the analysis of problems in which the data depart from the laws of exact causality. A general logical system of inductive reasoning has been devised that is applicable to data of this kind, and is now widely used in scientific research."

D. J. Finney

MEDICAL / DENTISTRY STATISTICS

- Definition: it is a mathematical science pertaining to the collection, analysis, interpretation or explanation, and presentation of *data*
 - improve the quality of data
 - with the design of experiments
 - survey sampling
 - provides tools for prediction and forecasting using data and statistical models
- Branches:
 - Descriptive statistics
 - Inferential statistics

MEDICAL / DENTISTRY STATISTICS

- Descriptive statistics:
 - Summarize or describe a collection of data
- Inferential statistics:
 - Used to draw inferences about a population from a sample:
 - Estimation: parameter and confidence interval
 - Hypothesis testing (null and alternative hypothesis): determine whether the data are strong enough to reject the null hypothesis

Tasks

- Why statistics is important for medicine / dentistry?
- How informatics is reflected in medical / dentistry practice?