



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
BACHELOR'S DEGREE (BSC)	MANAGEMENT ENGINEERING
INTEGRATED COURSE	OPERATIONS RESEARCH AND COMPANY DATA BASES - INTEGRATED COURSE
CODE	22427
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	MAT/09, ING-INF/05
HEAD PROFESSOR(S)	MANCINI SIMONA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	MANCINI SIMONA Professore Associato Univ. di PALERMO IMPASTATO SANDRO Professore a contratto Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	Annual
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	MANCINI SIMONA Wednesday 9:00 - 11:00 Online o in presenza. Ricevimento su prenotazione.

DOCENTE: Prof.ssa SIMONA MANCINI

PREREQUISITES	MODULE "OPERATIONS RESEACH" Linear Algebra ----- MODULE "DATA BASES" Fundamentals of Informatics
LEARNING OUTCOMES	MODULE "OPERATIONS RESEACH" Knowledge and understanding Techniques for modeling linear programming problems with continuous and integer variables. Familiarity with the main algorithmic methods of solution of the developed models Ability to apply knowledge and understanding Use of templates for transport applications, manufacturing and resource management, project management. Autonomy of judgment Ability and familiarity in developing and adapting the models seen in class to specific problems. Ability to predict difficulties and times required by the solution algorithms as a function of the complexity of the developed model. Communication skills Ability to formulate in words and in an unambiguous way the problems under examination. Direct language and synthesis skills. Learning skills Recognition and adaptation of the models seen in class to specific problems. ----- MODULE "DATA BASES" Expected outcomes in accordance with the Dublin descriptors: Objective 1 - Knowledge and understanding The student will acquire the theoretical knowledge related to databases, their design and use. To achieve this objective, the course includes lectures and analysis and discussion of case studies. Objective 2 - Applying Knowledge and understanding The student will acquire the ability to collect and formalize system requirements, to design a software system, even a complex one, and to estimate costs and time. To achieve this objective, the course includes analysis and discussion of case studies, individual and group exercises oriented to the implementation of methodologies for software development with the use of appropriate development environments. Objective 3 - Autonomy of judgment Students will learn the methodologies of design, implementation and evaluation of database system architectures and will analyze several case studies. They will be able to analyze data, even if limited and incomplete, at their disposal and propose adequate solutions for new problems integrating the knowledge acquired during the course. Students will be able to analyze the merits and demerits of the proposed solutions, implement risk-driven choices in the planning and implementation of the project and model an information system from requirements to implementation, testing and configuration/installation. To achieve this objective, the course includes: analysis and discussion of case studies; lectures and exercises on the design, implementation and evaluation of DB architectures. Objective 4 - Communication skills The student will acquire the ability to communicate competently and appropriately the knowledge acquired regarding issues related to DB design, implementation and evaluation. To achieve this objective, the course includes exercises on DB design and implementation and classroom discussions of projects and implementations. Objective 5 - Learning skills The student will be able to independently learn specific issues related to DB design and implementation. To achieve this objective, the course includes exercises regarding DB implementation.
ASSESSMENT METHODS	MODULE "OPERATIONS RESEACH" Written and oral exam 1. Assessment criteria for the written exam 5 tests including: 3 quizzes on the theory of mathematical modeling, models, relaxations, linear programs and simplex method, linear integer programs and branch and bound. 2. Assessment criteria for the oral exam An interview aiming at assessing skills and knowledge. -----

	<p>MODULE "DATA BASES" Written and oral examination. Assessment procedure for the Written Exam During the course, the feasibility of a possible midterm test will be considered, depending on the coursework done so far. The written test consists of at least three exercises aimed at verifying the student's knowledge of the topics covered during the course, and to apply the skills and knowledge acquired. The theoretical commentary on the results obtained is of fundamental importance. The evaluation is expressed in thirtieths. Evaluation criteria for the oral examination The oral test consists of an interview, aimed at ascertaining the possession of the skills and knowledge of the course; the evaluation is expressed in thirtieths. During the oral interview the student must be able to discuss the solutions proposed during the written test; moreover, questions of different and increasing complexity will be proposed in order to assess the achievement of the educational objectives and the communication skills of the student. Finally, in order to assess the autonomy of judgment, the student will be asked to analyze the characteristics of specific application scenarios and to propose the most appropriate solutions to the problems identified. The final evaluation will take into account both the scores of the written test and the oral test. Excellent (30-30 cum laude): during both tests the student should demonstrate complete mastery of the course topics. During the oral interview the student will have to demonstrate the maturity to connect the different aspects of the course and the ability to generalize. The student will have to show autonomy in the solution of the questions and the ability to identify the necessary information for their solution. Very good (27-29): good understanding of the topics; the student is able to apply the knowledge to solve the proposed problems. Good (24-26): good knowledge of the main topics, fair understanding and propriety of language, with ability to apply the knowledge to solve the problems proposed. Fair (21-23): more than sufficient mastery of the main topics, limited ability to independently apply the knowledge acquired. Sufficient (18-20): basic knowledge of the main topics and technical language. Insufficient: the student does not have an acceptable knowledge of the content of the topics covered in the course.</p> <p>There will be an intermediate exam at the end of the first Module</p>
<p>TEACHING METHODS</p>	<p>MODULE "OPERATIONS RESEACH" Frontal lessons, laboratories and courseworks</p> <p>-----</p> <p>MODULE "DATA BASES" Lectures and practical exercises.</p>

**MODULE
COMPANY DATA BASES**

Prof. SANDRO IMPASTATO

SUGGESTED BIBLIOGRAPHY

P. Atzeni, S. Ceri, P. Fraternali, S. Paraboschi, R. Torlone. Basi di Dati. McGraw- Hill, quinta edizione. ISBN: 978-8838694455

AMBIT	10657-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54

EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to provide the student with the knowledge and skills necessary to approach database design and the use of database management systems. In particular, issues related to the relational model, relational algebra, SQL language, and conceptual and logical design will be examined.

SYLLABUS

Hrs	Frontal teaching
6	Introduction to basic concepts; relational model; relations and tables; relation schemas and instances; keys, superkeys; integrity constraints.
12	Relational algebra: set operators; renaming, selection, and projection; natural join and theta-join; derived operators and advanced queries.
12	SQL: schemas and tables; intra- and inter-relational constraints; join; ordering; nested queries; aggregate operators; grouping queries; views.
6	Database design: Entity-Relationship model; conceptual design; design strategies.
6	Logical design: performance analysis; restructuring an Entity-Relationship schema; translation to the relational model.
Hrs	Practice
12	Relational model and relational algebra. SQL: simple and advanced queries. Conceptual and logical design of a database.

**MODULE
OPERATIONS RESEARCH**

Prof.ssa SIMONA MANCINI

SUGGESTED BIBLIOGRAPHY

“Ricerca Operativa”, Hillier Liebermann, McGraw Hill
dispense del corso disponibili online

AMBIT	50292-Matematica, informatica e statistica
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54

EDUCATIONAL OBJECTIVES OF THE MODULE

Development of Operations Research models. Development of modeling skills using continuous linear programming. Understanding of the basics of the Simplex Algorithm. Understanding of Duality theory and economic interpretation. Development of modeling skills using integer linear programming. Understanding of the basics of the Branch and Bound Algorithm for the exact solution of integer linear programs. Development of relaxation techniques.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to OR
10	Linear Program models
10	Simplex method
3	Duality theory
2	Introduction to Integer Linear Program
8	Models of Integer Linear Programs
5	Branch and Bound method
Hrs	Practice
7	Linear programs models, simplex and duality
7	Integer Linear Programs models, Branch and Bound