General Information	
Academic subject	**Integrated Course: Rural buildings and Energy efficiency**
Degree course	**Module: Energy efficiency in Rural buildings**
Curriculum	
ECTS credits	**3 ECTs**
Compulsory attendance	**No**
Language	**Italian**

Subject teacher	Name Surname	Mail address	SSD
	Giacomo Scarascia-Mugnozza	**giacomo.scarasciamugnozza@uniba.it**	**AGR/10**

ECTS credits details			ETCs
Basic teaching activities	**2 ECTs Lectures**	**1 ECTs Lab**	**3**

Class schedule	
Period	**I semester**
Year	**III year**
Type of class	**Lectures, laboratories, workshops**

Time management	
Hours	**75 hours**
In-class study hours	**30 hours**
Out-of-class study hours	**45 hours**

Academic calendar	
Class begins	**28/09/2020**
Class ends	**22/01/2021**

Syllabus	
Prerequisites/requirements	**Fundamentals of Mathematics, Fundamentals of Physics and Thermodynamics**
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	***Knowledge and understanding*** o Knowledge and understanding of heat transmission and heat loss o Knowledge and understanding of materials and systems for rural building insulation o Knowledge and understanding for rural building construction and equipment energy demand and efficiency o Knowledge and understanding of the renewable energy sources and greenhouse gases emission reduction o Knowledge and understanding of the energy performance certificate for buildings ***Applying knowledge and understanding*** o Capacity to identify materials and systems for rural building energy efficiency o Capacity to identify the renewable energy sources for agricultural and forest buildings and equipment o Capacity to evaluate and draw up the energy performance certificate for buildings ***Making informed judgements and choices*** o Expertise of rural building energy efficiency design o Expertise of renewable energy sources design for agricultural and forest buildings and equipment o Expertise to draw up the energy performance certificate for buildings ***Communicating knowledge and understanding***

	○ Ability to communicate information, ideas, problems and solutions regarding energy demand and efficiency for agricultural and forestry buildings to both specialist and non-specialist audiences ○ Ability to communicate information, ideas, problems and solutions regarding renewable energy sources to both specialist and non-specialist audiences ○ Ability to communicate information, ideas, problems and solutions regarding the energy performance certificate for buildings to both specialist and non-specialist audiences ***Capacities to continue learning*** ○ Capacity to continue learning future development on energy efficiency, renewable energy sources and greenhouse gases emission reduction The results of the expected learning, in term of knowledge and ability, are listed in the Annex A of the Didactic Regulation of the Bachelor Course (expressed by the European descriptors of the study title).
Contents	**Fundamentals of Thermodynamics.** **Fundamentals of heat transmission: conduction, convection, radiation.** **The global heat exchange coefficient.** **Thermal transmittance of walls and roofs.** **Building energy loss. Thermal bridges and insulation.** **The diagram of air humidity.** **Energy performance certificate for buildings.** **Construction systems and quality related to the reduction of energy demand and consumption.** **The fossil and renewable energy sources.** **Renewable energies: solar, wind, hydro, geothermal, biomass.** **The renewable energy sources in the agricultural sector.**
Course program	
Bibliography	○ **Notes of the lectures on PDF format and tables distributed during the course** ○ **Kreith F. "Principi di trasmissione del calore" Liguori editore** ○ **Moncada Lo Giudice G. "Fisica tecnica ambientale" Zanichelli** ○ ○ **www.architetto-online.it / com** ○ **www.edilportale.com/** ○ **http://www.aiia.info/** ○ **http://www.eurageng.net/** ○ **http://www.asabe.org/**
Notes	
Teaching methods	**Lectures will take place by means of Power Point presentations.** **Practical exercises will concern thermal properties of construction materials, specimen of insulation materials and examples of energy performance certificate for buildings drawing up**.
Assessment methods (indicate at least the type written, oral, other)	**The final exam consists on an oral test with questions related to the course programme lectures and practical exercises. The final grade is expressed in thirtieths. The exam is passed if the grade is at least 18/30.** **Foreign students can take the exam in English language.**
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are)	***Knowledge and comprehension ability*** ○ Knowledge and understanding of heat transmission and heat loss ○ Knowledge and understanding of materials and systems for rural building insulation

	○ Knowledge and understanding of the renewable energy sources and greenhouse gases emission reduction ***Knowledge and applied comprehension ability*** ○ Capacity to identify materials and systems for rural building energy demand and efficiency ○ Capacity to identify the renewable energy sources for agricultural and forest buildings and equipment ○ Capacity to evaluate and draw up the energy performance certificate for buildings ***Autonomy of judgement*** ○ Expertise to research alternative options of the energy planning and the energy performance certificate for buildings ○ Expertise to evaluate different solutions of renewable energy sources systems for agricultural and forest buildings and equipment ***Communication skills*** ○ Ability to communicate information, ideas, problems and solutions regarding energy efficiency, energy performance certificate and renewable energy sources ***Learning ability*** ○ Learning ability and overall correlation among various issues of the lectures ○ Self follow-up learning ability of future development regarding the issues of the lectures
Further information	Visiting hours: **Tuesday, Thursday and Friday from 11.30am to 13.30; other days by appointment to be defined by email**