This listing gives a number of suggested project topics, together with a few articles as examples of each topic. Introductory descriptions about these (and many other!) topics can be found in both the course textbook and in "Encyclopedia of Astrobiology" by M.Gargaud et al. (Springer, 2015). That can be read as an e-book in the Physics and astronomy library and can be reached either from there, or directly from http://link.springer.com.

The same topic should not be selected by more than two student groups. However, participants may suggest other topics, also such quite different from what is listed here. However, proposed topics must be approved by the course responsible.

(1) WHAT IS LIFE?

S.A.Benner:
Defining Life
Astrobiology 10, 1021-1030 (2010)

S.Tirard, M.Morange, A.Lazcano
The Definition of Life: A Brief History of an Elusive Scientific Endeavor
Astrobiology 10, 1003-1009 (2010)

(2) LIFE IN EXTREME ENVIRONMENTS

L.R.Dartnell
Ionizing Radiation and Life
Astrobiology 11, 551-582 (2011)

EXPOSE-E: An ESA Astrobiology Mission 1.5 Years in Space
Astrobiology 12, 374-386 (2015)

D.Tepfer, S.Leach
Survival and DNA Damage in Plant Seeds Exposed for 558 and 682 Days outside the International Space Station
Astrobiology 17, 205-215 (2017)

J.Frösler, C.Panitz, J.Wingender, H.-C.Flemming, P.Rettberg
Survival of Deinococcus geothermalis in Biofilms under Desiccation and Simulated Space and Martian Conditions
Astrobiology 17, 431-447 (2017)

Spectroscopy and Viability of Bacillus subtilis Spores after Ultraviolet Irradiation: Implications for the Detection of Potential Bacterial Life on Europa

P.D.Cooper
Babies on Mars: Biomedical Considerations for the First Martian Generation
(3) INTERSTELLAR AND PREBIOTIC CHEMISTRY

L.M.Ziurys, D.T.Halfen, W.Geppert, Y.Aikawa
Following the Interstellar History of Carbon: From the Interiors of Stars to the Surfaces of Planets
Astrobiology 16, 997-1012 (2016)

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(4) EVOLUTION OF THE EARTH

Co-Evolution of Atmospheres, Life, and Climate
Astrobiology 10, 77-88 (2010)

Modeling pN₂ Through Geological Time: Implications for Planetary Climates and Atmospheric Biosignatures
Astrobiology 16, 949-963 (2016)

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(5) HABITABILITY OF MARS

C.S.Cockell
Trajectories of Martian Habitability
Astrobiology 14, 182-203 (2014)

Astrobiology through the Ages of Mars: The Study of Terrestrial Analogues to Understand the Habitability of Mars
Astrobiology 10, 821-843 (2010)

F.Westall, D.Loizeau, F.Foucher, N.Bost, et al.
Habitability on Mars from a Microbial Point of View
Astrobiology 13, 887-897 (2013)

C.R.Cousins, I.A.Crawford
Volcano-Ice Interaction as a Microbial Habitat on Earth and Mars
Astrobiology 11, 695-710 (2011)

Survival Potential and Photosynthetic Activity of Lichens under Mars-Like Conditions: A Laboratory Study

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(6) MARS SPECIAL REGIONS

A New Analysis of Mars “Special Regions” : Findings of the Second MEPAG Special Regions Science Analysis Group
Astrobiology 14, 887-968 (2014)

Planetary Protection and Mars Special Regions – A Suggestion for Updating the Definition
Astrobiology 16, 119-125 (2016)

A.F.Davila, D.Schulze-Makuch
The Last Possible Outposts for Life on Mars
Astrobiology 16, 159-168 (2016)

The Argyre Region as a Prime Target for in situ Astrobiological Exploration of Mars
Astrobiology 16, 143-158 (2016)

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(7) FUTURE MARS MISSIONS AND SEARCH FOR BIOSIGNATURES

J.L.Vago, F.Westall, Pasteur Instrument Teams, Landing Site Selection Working Group, et al.
Habitability on Early Mars and the Search for Biosignatures with the ExoMars Rover
Astrobiology 17, 471-510 (2017)

Biosignature Preservation and Detection in Mars Analog Environments
Astrobiology 17, 363-400 (2017)
(8) EXTRATERRESTRIAL SAMPLES AND PLANETARY PROTECTION

Planning Considerations Related to the Organic Contamination of Martian Samples and Implications for the Mars 2020 Rover

Mars Exploration Program Analysis Group (MEPAG)

Review of Exchange Processes on Ganymede in View of Its Planetary Protection Categorization

(9) TERRAFORMING MARS

C.P.McKay, O.B.Toon, J.F.Kasting
*Making Mars Habitable*

C.P.McKay, M.M.Marinova.
The Physics, Biology, and Environmental Ethics of Making Mars Habitable

J.M.Graham
The Biological Terraforming of Mars: Planetary Ecosynthesis as Ecological Succession on a Global Scale

Sustainable life support on Mars – The Potential Roles of Cyanobacteria

(10) HABITABILITY IN THE SOLAR SYSTEM

Habitability: A Review

J.T.O'Malley-James, J.S.Greaves, J.A.Raven, C.S.Cockell
In Search of Future Earths: Assessing the Possibility of Finding Earth Analogues in the Later Stages of Their Habitable Lifetimes

(11) MISSIONS TO THE JUPITER MOON EUROPA

Science Potential from a Europa Lander

P.Judge
A Novel Strategy to Seek Biosignatures at Enceladus and Europa

(12) THE SATURN MOON ENCELADUS

D.Deamer, B.Damer
Can Life Begin on Enceladus? A Perspective from Hydrothermal Chemistry

S.A.Benner
Detecting Darwinism from Molecules in the Enceladus Plumes, Jupiter’s Moons, and Other Planetary Water Lagoons

L.M.Barge, L.M.White
Experimentally Testing Hydrothermal Vent Origin of Life on Enceladus and Other Icy/Ocean Worlds
(13) PREBIOTIC CHEMISTRY ON TITAN

C.D. Neish, Á. Somogyi, M.A. Smith

Titan’s Primordial Soup: Formation of Amino Acids via Low-Temperature Hydrolysis of Tholins

(14) HABITABILITY OF EXOPLANETS

The Habitability of Proxima Centauri b. I. Irradiation, Rotation and Volatile Inventory from Formation to the Present

The Habitability of Proxima Centauri b. II. Possible Climates and Observability

M. Lingam, A. Loeb
Enhanced Interplanetary Panspermia in the TRAPPIST-1 System

(15) HABITABILITY IN SPECIAL ENVIRONMENTS

J. J. Jiménez-Torres, B. Pichardo, G. Lake, A. Segura
Habitability in Different Milky Way Stellar Environments: A Stellar Interaction Dynamical Approach
Astrobiology 13, 491-509 (2013)

R. Barnes, R. Heller
Habitable Planets around White and Brown Dwarfs: The Perils of a Cooling Primary
Astrobiology 13, 279-291 (2013)

Formation, Habitability, and Detection of Extrasolar Moons
Astrobiology 14, 798-835 (2014)

I. I. Shevchenko
Habitability Properties of Circumbinary Planets

J. S. Yates, P. I. Palmer, B. Biller, C. S. Cockell
Atmospheric Habitable Zones in Y Dwarf Atmospheres

(16) FUTURE TECHNIQUES FOR OBSERVING EXOPLANETS

C. Beichman, B. Benneke, H. Knutson, R. Smith, et al.
Observations of Transiting Exoplanets with the James Webb Space Telescope

B. P. Crill, N. Siegler
Space Technology for Directly Imaging and Characterizing Exo-Earths

(17) BIOSIGNATURES OF THE EARTH

S. Seager, M. Schrenk, W. Bains
An Astrophysical View of Earth-Based Metabolic Biosignature Gases
Astrobiology 12, 61-82 (2012)

Properties of an Earth-Like Planet Orbiting a Sun-Like Star: Earth Observed by the EPOXI Mission
Astrobiology 11, 907-930 (2011)

Earth as an Extrasolar Planet: Earth Model Validation Using EPOXI Earth Observations
Astrobiology 11, 393-408 (2011)
(18) BIOSIGNATURES ON EXOPLANETS

C.T.Reinhard, S.L.Olson, E.W.Schwieterman, T.W.Lyons
False Negatives for Remote Life Detection on Ocean-Bearing Planets: Lessons from the Early Earth
Astrobiology 17, 287-297 (2017)

L.D.Deming, S.Seager
Illusion and Reality in the Atmospheres of Exoplanets

S.Rugheimer, L.Kaltenegger, A.Zsom, A.Segura, D.Sasselov
Spectral Fingerprints of Earth-like Planets around FGK Stars
Astrobiology 13, 251-269 (2013)

L.Kreidberg
Exoplanet Atmosphere Measurements from Transmission Spectroscopy and other Planet-Star Combined
Light Observations

T.Fauchez, L.Rossi, D.M.Stam
The O2 A-Band in the Fluxes and Polarization of Starlight Reflected by Earth-Like Exoplanets

R.Claudi
Exoplanets: Possible Biosignatures

S.Seager, W.Bains, J.J.Petkowski
Toward a List of Molecules as Potential Biosignature Gases for the Search for Life on Exoplanets and
Applications to Terrestrial Biochemistry
Astrobiology 16, 465-485 (2016)

C.E.Doughty, A.Wolf
Detecting Tree-like Multicellular Life on Extrasolar Planets
Astrobiology 10, 869-879 (2010)

(19) SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE

N.A.Cabrol
Alien Mindscapes—A Perspective on the Search for Extraterrestrial Intelligence
Astrobiology 16, 661-676 (2016)

R.Zubrin
Interstellar Communication using Microbial Data Storage: Implications for SETI
J.British Interplanetary Society 70, 163-174 (2017)

N.K.Tellis, G.W.Marcy
A Search for Laser Emission with Megawatt Thresholds from 5600 FGKM Stars

The Breakthrough Listen Search for Intelligent Life: 1.1-1.9 GHz observations of 692 Nearby Stars

(20) PHILOSOPHY AND ETHICS OF ASTROBIOLOGY

S.J.Dick
Critical Issues in the History, Philosophy, and Sociology of Astrobiology
Astrobiology 12, 906-927 (2012)

E.Persson
The Moral Status of Extraterrestrial Life
Astrobiology 12, 976-984 (2012)