



**UMS**  
UNIVERSITI MALAYSIA SABAH



## **KRITERIA**

# **UI GREENMETRIC WORLD UNIVERSITY RANKING**

**2019**



Transformation towards  
**UNIVERSITY  
INDUSTRY 4.0**



Table 1 Categories used in the ranking and their weighting

No	Category	Percentage of Total Points (%)
1	Setting and Infrastructure (SI)	15
2	Energy and Climate Change (EC)	21
3	Waste (WS)	18
4	Water (WR)	10
5	Transportation (TR)	18
6	Education (ED)	18
	<b>TOTAL</b>	<b>100</b>

1. **Setting and Infrastructure (SI)** **1,500**

The campus setting and infrastructure information will provide the basic information of the university consideration towards a green environment. This indicator also shows whether the campus deserves to be called a Green Campus. The aim is to trigger the participating universities to provide more spaces for greenery and to safeguard the environment, as well as the development of sustainable energy.

**1.1. Types of the higher education institution**

**1.2. Climate**

**1.3. Number of campus sites** **E**

**1.4. Campus setting** **E**

**1.5. Total campus area (m<sup>2</sup>)** **E**

**1.6. Total campus ground floor area of buildings (m<sup>2</sup>)**

**1.7. Total campus buildings area (m<sup>2</sup>)**

**1.8. The ratio of open space area to total area** **P** **300**

**Formula:**  $((1.5-1.6/1.5) \times 100\%)$

Please select one of the following options:

[1]  $\leq 1\%$

[2]  $> 1 - 80\%$

[3]  $> 80 - 90\%$

[4]  $> 90 - 95\%$

[5]  $> 95\%$

**1.9. Total area on campus covered in forest vegetation** **P** **200** **E**

- [1]  $\leq 2\%$  (provide total area in square meters)
- [2]  $> 2 - 9\%$  (provide total area in square meters)
- [3]  $> 9 - 22\%$  (provide total area in square meters)
- [4]  $> 22 - 35\%$  (provide total area in square meters)
- [5]  $> 35\%$  (provide total area in square meters)

**1.10. Total area on campus covered in planted vegetation** **P** **300**

- [1]  $\leq 10\%$  (provide total area in square meters)
- [2]  $> 10 - 20\%$  (provide total area in square meters)
- [3]  $> 20 - 30\%$  (provide total area in square meters)
- [4]  $> 30 - 40\%$  (provide total area in square meters)
- [5]  $> 40\%$  (provide total area in square meters)

**1.11. Total area on campus for water absorption besides the forest and planted vegetation**

**P** **200**

- [1]  $\leq 2\%$  (provide total area in square meters)
- [2]  $> 2 - 10\%$  (provide total area in square meters)
- [3]  $> 10 - 20\%$  (provide total area in square meters)
- [4]  $> 20 - 30\%$  (provide total area in square meters)
- [5]  $> 30\%$  (provide total area in square meters)

**1.12. Total number of regular students**

**1.13. Total number of online students**

**1.14. Total number of academic and administrative staff**

**1.15. The total open space area divided by total campus population** P 300

**Formula:  $((1.5-1.6)/(1.12+1.14))$**

Please select one of the following options:

[1]  $\leq 10 \text{ m}^2$

[2]  $> 10 - 20 \text{ m}^2$

[3]  $> 20 - 40 \text{ m}^2$

[4]  $> 40 - 70 \text{ m}^2$

[5]  $> 70 \text{ m}^2$

**1.16. Total university budget (in US Dollars)**

**1.17. University budget for sustainability efforts (in US Dollars)**

**1.18. Percentage of university budget for sustainability efforts within a year** P 200

Please select one of the following options:

[1]  $\leq 1\%$

[2]  $> 1 - 3\%$

[3]  $> 3 - 10\%$

[4]  $> 10 - 12\%$

[5]  $> 12\%$

## 2. Energy and Climate Change (EC) **2,100**

The university's attention to the use of energy and climate change issues is the indicator with the highest weighting in this ranking. In our questionnaire we define several indicators for this particular area of concern, i.e. energy efficient appliances usage, the implementation of smart buildings/automation buildings/intelligent buildings, renewable energy usage policy, total electricity usage, energy conservation programs, elements of green buildings, climate change adaptation and mitigation programs, greenhouse gas emission reductions policy and carbon footprint. Within these indicators, the universities are expected to increase their efforts in energy efficiency in their buildings and to care more about nature and energy resources.

### 2.1. Energy efficient appliances usage **P** **200** **E**

[1] < 1%

[2] 1 - 25%

[3] > 25 - 50%

[4] > 50 - 75%

[5] > 75%

### 2.2. Total campus smart building area (m<sup>2</sup>)

..... automation, safety (physical security, presence sensors, video surveillance/CCTV), energy, water (sanitation), indoor environment (thermal comfort and air quality), and lighting (illumination, low power lighting) .....

**2.3. Smart building implementation** **P** **300** **E**

**Formula:  $((2.2/1.7) \times 100\%)$**

Please select one of the following options:

- [1] < 1%
- [2] 1 - 25%
- [3] > 25 - 50%
- [4] > 50 - 75%
- [5] > 75%

**2.4. Number of renewable energy sources in campus** **P** **300**

- [1] None
- [2] 1 source
- [3] 2 sources
- [4] 3 sources
- [5] > 3 sources

**2.5. Please specify renewable energy sources in campus and provide capacity produced** E

- [1] Not applicable
- [2] Biodiesel (provide capacity in kilowatt hour)
- [3] Clean biomass (provide capacity in kilowatt hour)
- [4] Solar power (provide capacity in kilowatt hour)
- [5] Geothermal (provide capacity in kilowatt hour)
- [6] Wind power (provide capacity in kilowatt hour)
- [7] Hydropower (provide capacity in kilowatt hour)
- [8] Combine Heat and Power (provide capacity in kilowatt hour)

**2.6. Electricity usage per year (in kilowatt hour)** E

**2.7. The total electricity usage divided by total campus population (kWh per person)**

P

300

**Formula: (2.6) / (1.12+1.14)**

Please select one of the following options:

- [1]  $\geq 2424$  kWh
- [2]  $< 2424 - 1535$  kWh
- [3]  $< 1535 - 633$  kWh
- [4]  $< 633 - 279$  kWh
- [5]  $< 279$  kWh

**2.8. The ratio of renewable energy production divided by total energy usage per year** P

200

- [1]  $\leq 0.5\%$
- [2]  $> 0.5 - 1\%$
- [3]  $> 1 - 2\%$
- [4]  $> 2 - 25\%$
- [5]  $> 25\%$

**2.9. Elements of green building implementation as reflected in all construction and renovation policies** P 300 E

- [1] None. Please select this option if there is no green building implementation
- [2] 1 element
- [3] 2 elements
- [4] 3 elements
- [5]  $> 3$  elements

**2.10. Greenhouse gas emission reduction program** P 200

- [1] None. Please select this option if the reduction program is needed, but nothing has been done.
- [2] Program in preparation (e.g. feasibility study and promotion)
- [3] Program(s) aims to reduce one out of three scopes emissions (Scope 1 or 2 or 3)
- [4] Program(s) aims to reduce two out of three scopes emissions (Scope 1 and 2 or Scope 1 and 3 or Scope 2 and 3)
- [5] Program(s) aims to reduce all three scopes emissions (Scope 1, 2 and 3)

Table 3. List of greenhouse gas emission sources (Woo & Choi, 2013)

	<b>Emission data</b>	<b>Definition</b>
<b>Scope 1</b>	Stationary combustion	Stationary combustion refers to the burning of fuels to produce electricity, steam and heat in a fixed location such as boilers, burners, heaters, kilns, and engines.
	Mobile combustion	Burning of fuels by institution-owned transportation devices.
	Process emissions	Direct greenhouse gas (GHG) emissions from physical or chemical processes rather than from fuel combustion.
	Fugitive emissions	Hydrofluorocarbon releases during the use of refrigeration and air conditioning equipment and methane leakage from natural gas transport.
<b>Scope 2</b>	Purchased electricity	Indirect GHG emissions resulting from the generation of the electricity purchased and used by the institution
<b>Scope 3</b>	Waste	Indirect GHG emissions resulting from the incineration or landfill of institution's solid waste
	Purchased waste	Indirect GHG emissions resulting from the generation of water supply purchased and used by the institution.
	Commuting	Indirect GHG emissions resulting from regular commuting to and from institutions by students and employees
	Air travel	Indirect GHG emissions resulting from air travels paid by institutions.

**2.11. Please provide the total carbon footprint (CO<sub>2</sub> emission in the last 12 months, in metric tons,**

**Total Emission Per Year**

= total emission from electricity usage + transportation (bus, car, motorcycle)

**a. Electricity Usage Per Year**

The CO<sub>2</sub> emission from electricity

= (electricity usage per year in kWh/1000) x 0.84

**b. Transportation Per Year (Bus)**

= (Number of the shuttle bus in your university x total trips for shuttle bus service each day x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 240/100) x 0.01

*Notes:*

240 is the number of working days per year

0.01 is the coefficient (source: [www.carbonfootprint.com](http://www.carbonfootprint.com)) to calculate the emission in metric tons per 100 km for bus

**c. Transportation Per Year (Car)**

= (Number of cars entering your university x 2 x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 240/100) x 0.02

*Notes:*

240 is the number of working days per year

0.02 is the coefficient (source: [www.carbonfootprint.com](http://www.carbonfootprint.com)) to calculate the emission in metric tons per 100 km car

#### d. Transportation Per Year (Motorcycle)

= (Number of motorcycle entering your university x 2 x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 240/100) x 0.01

*Notes:*

240 is the number of working days per year

0.01 is the coefficient (source: [www.carbonfootprint.com](http://www.carbonfootprint.com)) to calculate the emission in metric tons per 100 km for motorcycle

### 2.12. The total carbon footprint divided by total campus population (metric tons per person)

**Formula: (2.11)/(1.12+1.14) P 300**

Please select one of the following options:

[1]  $\geq 2.05$  metric tons

[2]  $< 2.05 - 1.11$  metric tons

[3]  $< 1.11 - 0.42$  metric tons

[4]  $< 0.42 - 0.10$  metric tons

[5]  $< 0.10$  metric tons

### 3. Waste (WS) **1,800**

Waste treatment and recycling activities are major factors in creating a sustainable environment. The activities of university staff and students on campus will produce a lot of waste; therefore, some recycling and waste treatments programs should be among the concern of the university, i.e. recycling program, organic waste treatment, inorganic waste treatment, toxic waste recycling, sewage disposal, policies to reduce the use of paper and plastic on campus.

#### 3.1. Recycling program for university waste **P** **300** **E**

- [1] Not applicable. Please select this option if there is no program at your university.
- [2] Partial (1 - 25% of waste)
- [3] Partial (> 25 - 50% of waste)
- [4] Partial (> 50 - 75% of waste)
- [5] Extensive (> 75% of waste)

#### 3.2. Program to reduce the use of paper and plastic on campus **P** **300** **E**

- [1] Not applicable. Please select this option if there is no program at your university.
- [2] 1 program
- [3] 2 programs
- [4] 3 programs
- [5] More than 3 programs

**3.3. Organic waste treatment** **P** **300** **E**

- [1] Open dumping
- [2] Partial (1 - 25% treated)
- [3] Partial (> 25 - 50% treated)
- [4] Partial (> 50 - 75% treated)
- [5] Extensive (> 75% treated)

**3.4. Inorganic waste treatment** **P** **300** **E**

- [1] Burned in the open
- [2] Partial (1 - 25% treated)
- [3] Partial (> 25 - 50% treated)
- [4] Partial (> 50 - 75% treated)
- [5] Extensive (> 75% treated)

**3.5. Toxic waste treatment** **P** **300** **E**

- [1] Not managed
- [2] Partial (1 - 25% treated)
- [3] Partial (> 25 - 50% treated)
- [4] Partial (> 50 - 75% treated)
- [5] Extensive (> 75% treated)

### 3.6. Sewage disposal **P** **300** **E**

- [1] Untreated into waterways
- [2] Treated conventionally
- [3] Treated technically for reuse
- [4] Treated technically for downcycling
- [5] Treated technically for upcycling

#### 4. Water (WR) **1,000**

Water usage on campus is another important indicator in the UI GreenMetric. The aim is to encourage universities to decrease ground water usage, increase conservation programs, and protect the habitats. Water conservation programs, water recycling programs, water efficient appliances usage, and treated water usage are among the criteria.

##### 4.1. Water conservation program implementation **P** **300** **E**

- [1] None. Please select this option if conservation program is needed, but nothing has been done
- [2] Program in preparation (e.g. feasibility study and promotion)
- [3] 1 - 25% implemented at an early stage (e.g. measurement of potential surface runoff volume)
- [4] > 25 - 50% water conserved
- [5] > 50% water conserved

##### 4.2. Water recycling program implementation **P** **300** **E**

- [1] None. Please select this option if the water recycling program is needed, but nothing has been done
- [2] Program in preparation (e.g. feasibility study and promotion)
- [3] 1 - 25% Implemented at an early stage (e.g. measurement of wastewater)
- [4] > 25 - 50% water recycled
- [5] > 50% water recycled

#### 4.3. Water efficient appliances usage **P** **200** **E**

- [1] None. Water efficient appliances are needed, but nothing has been done.
- [2] Program in preparation (e.g. feasibility study and promotion)
- [3] 1 - 25% of water efficient appliances installed
- [4] > 25 - 50% of water efficient appliances installed
- [5] > 50% of water efficient appliances installed

#### 4.4. Treated water consumed **P** **200** **E**

- [1] None
- [2] 1 - 25% treated water consumed
- [3] > 25 - 50% treated water consumed
- [4] > 50 - 75% treated water consumed
- [5] > 75% treated water consumed

**5. Transportation (TR) 1,800**

Transportation systems play an important role in carbon emission and pollutant levels in universities. Transportation policies to limit the number of motor vehicles on campus uses of campus buses and bicycles will encourage a healthier environment. The pedestrian policy will encourage students and staff to walk around campus and avoid using private vehicles. The use of environmentally friendly public transportation will decrease the carbon footprint around campus.

**5.1. Number of cars actively used and managed by the university**

**5.2. Number of cars entering the university daily**

**5.3. Number of motorcycles entering the university daily**

**5.4 The total number of vehicles (cars and motorcycles) divided by total campus population** **P**

**200**

**Formula:  $(5.1+5.2+5.3)/(1.12+1.14)$**

Please select one of the following options:

[1]  $\geq 1$

[2]  $< 1 - 0.5$

[3]  $< 0.5 - 0.125$

[4]  $< 0.125 - 0.045$

[5]  $< 0.045$

### **5.5. Shuttle services** **P** **300** **E**

- [1] Shuttle service is possible but not provided by the university
- [2] Shuttle service is provided (by the university or other parties) and regular but not free
- [3] Shuttle service is provided (by the university or other parties) and the university contributes a part of the cost.
- [4] Shuttle service is provided by the university, regular, and free
- [5] Shuttle service is provided by the university, regular, and zero emission. Or shuttle use is not possible (not applicable)

### **5.6. Number of shuttles operated in your university**

### **5.7. The average number of passengers of each shuttle**

### **5.8. Total trips of each shuttle services each day**

### **5.9. Zero Emission Vehicles (ZEV) policy on campus** **P** **200** **E**

- [1] Zero Emission Vehicles are not available
- [2] Zero Emission Vehicles use is not possible or practical
- [3] Zero Emission Vehicles are available, but not provided by the university
- [4] Zero Emission Vehicles are available, and provided by the university and charged
- [5] Zero Emission Vehicles are available and provided by the university free

**5.10. The average number of Zero Emission Vehicles (ZEV) on campus per day**

**5.11. The total number of Zero Emission Vehicles (ZEV) divided by total campus population**

**Formula:  $(5.10)/(1.12+1.14)$**  **P** **200**

Please select one of the following options:

[1]  $\leq 0.002$

[2]  $> 0.002$  to  $\leq 0.004$

[3]  $> 0.004$  to  $\leq 0.008$

[4]  $> 0.008$  to  $\leq 0.02$

[5]  $> 0.02$

**5.12. Total parking area (m<sup>2</sup>)**

**5.13. The ratio of the parking area to total campus area** **P** **200** **E**

**Formula:  $((5.12/1.5) \times 100\%)$**

Please select one of the following options:

[1]  $> 11\%$

[2]  $< 11 - 7\%$

[3]  $< 7 - 4\%$

[4]  $< 4 - 1\%$

[5]  $< 1\%$

**5.14. Transportation program designed to limit or decrease the parking area on campus for the last 3 years**

[1] Not applicable

P

200

[2] Program in preparation (e.g. feasibility study and promotion)

[3] The program resulting in less than 10% decrease in the parking area

[4] Program resulting in 10 - 30% decrease in the parking area

[5] The program resulting in more than 30% decrease in the parking area or parking is restricted

**5.15. Number of transportation initiatives to decrease private vehicles on campus**

P

200

E

[1] Not applicable

[2] 1 initiative

[3] 2 initiatives

[4] 3 initiatives

[5] > 3 initiatives

**5.16. Pedestrian path policy on campus**

P

300

E

[1] Pedestrian paths are not applicable

[2] Pedestrian paths are available

[3] Pedestrian paths are available and designed for safety

[4] Pedestrian paths are available, designed for safety and convenience

[5] Pedestrian paths are available, designed for safety, convenience, and in some parts provided with disabled-friendly features

**5.17. The approximate daily travel distance of a vehicle inside your campus only (in Kilometers)**

**6. Education and Research (ED) 1,800**

**6.1. Number of courses/subjects related to sustainability offered E**

**6.2. Total number of courses/subjects offered E**

**6.3. The ratio of sustainability courses to total courses/subjects P 300**

**Formula:  $((6.1/6.2) \times 100\%)$**

Please select one of the following options:

[1]  $\leq 1\%$

[2]  $> 1 - 5\%$

[3]  $> 5 - 10\%$

[4]  $> 10 - 20\%$

[5]  $> 20\%$

**6.4. Total research funds dedicated to sustainability research (in US Dollars) E**

**6.5. Total research funds (in US Dollars) E**

**6.6 The ratio of sustainability research funding to total research funding P 300**

**Formula:  $((6.4/6.5) \times 100\%)$**

Please select one of the following options:

[1]  $\leq 1\%$

[2]  $> 1 - 8\%$

[3]  $> 8 - 20\%$

[4]  $> 20 - 40\%$

[5]  $> 40\%$

**6.7. Number of scholarly publications on sustainability** P 300

[1] 0

[2] 1 - 20

[3] 21 - 83

[4] 84 - 300

[5] > 300

**6.8. Number of events related to sustainability** P 300 E

[1] 0

[2] 1 - 4

[3] 5 - 17

[4] 18 - 47

[5] > 47

**6.9. Number of student organizations related to sustainability** P 300

[1] 0

[2] 1 - 2

[3] 3 - 4

[4] 5 - 10

[5] > 10

**6.10. University-run sustainability website** **P** **200**

**6.11. Sustainability website address (URL) if available**

**6.12. Sustainability report** **P** **100** **E**

If your university has a sustainability report. Please select the following options:

[1] Not available

[2] A sustainability report is in preparation

[3] A sustainability report is available and accessible

[4] A sustainability report is available, accessible and updated occasionally

[5] A sustainability report is available, accessible and updated annually